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# **Design Guide For U.S. Army Reserve Facilities**

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CEMP-EA Engineer Design Guide 1110-3-107	Department of the Army U.S. Army Corps of Engineers Washington, DC 20314-1000	DG 1110-3-107 September 1984
	U.S. ARMY RESERVE FACILITIES	
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SEPTEMBER 1984

DG 1110-3-107

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## FOREWORD

The Design Guide (DG) series of documents is issued under the standard design medium by the Engineering Division, Engineering and Construction Directorate, Office of the Chief of Engineers, U.S. Army.

This guide governs design of U.S. Army Reserve Facilities. Included are the training center building, organizational maintenance shops, area maintenance support activities, and direct support and general support maintenance shops.

This guide provides planning and design guidance, discussed separately in the form of example sketches, which establish concept alternatives for executing project designs.

This guide is applicable to all new construction projects as well as projects involving modernization of existing facilities.

Development of this guide was under the direction of the Architectural Section, Architectural and Building Systems Branch of the Engineering Division, and is based on the results of an architectural services contract with the firm of Associated Space Design, Inc., Atlanta, Georgia, contract number DACA 87-83-C-0032.

Material related to functional needs has been developed in conjunction with, and approved by, the Office of the Chief, Army Reserve, and the Office, Chief of Engineers.

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DESIGN GUIDE  
 No. 1110-3-107

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## CHAPTER 1

## INTRODUCTION

1-1. Purpose. This guide contains design criteria and general requirements to be used in the development of U.S. Army Reserve facilities (Figure 1-1). This guide provides a comprehensive means by which the functional criteria may be conveyed by the Using Service (Office of the Chief, Army Reserve), for Military Construction Army Reserve (MCAR) projects and the Support Installation for MCAR projects to the Design Agency (Corps of Engineers, other engineering commands and consulting architectural and engineering firms) charged with the planning of a facility. This guide is also intended to aid in the formulation of project documentation for inclusion in military construction programs.

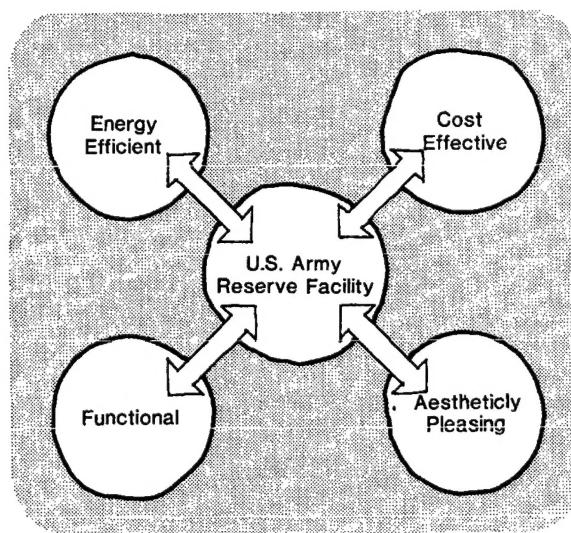


Figure 1-1. Design criteria and requirements.

1-2. Scope.

a. This guide is applicable to all new construction projects for U.S. Army Reserve facilities and as a general guide in the modernization of existing facilities (Figure 1-2). Only the more common or typical features associated with U.S. Army Reserve facilities are addressed. The guide deals primarily with training center buildings and vehicle maintenance shops which directly support a training facility or group of facilities.

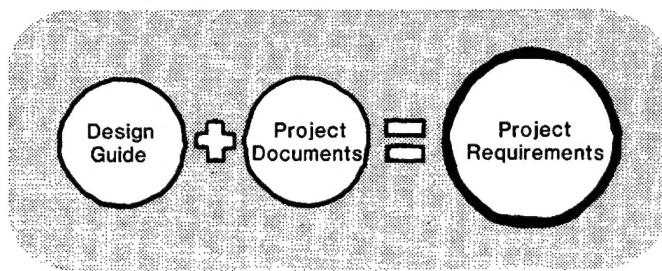


Figure 1-2. Project requirements.

b. The intent of the guide is to provide some of the general information and guidance required for the successful preparation of project designs. Additional specific information and guidance must be obtained from the Design Agency and Using Service on such matters as local codes, site constraints and project scope.

c. Unless otherwise noted, all built-in equipment and furnishings required by this guide will be contractor furnished and installed. The cost of these items is included in the construction contract. Moveable equipment, furnishings or specialty items will be furnished by the Using Service and installed under separate contract. See appendix A for list of items funded with Operation & Maintenance Army Reserve (OMAR) funds.

#### 1-3. Format.

a. The Design Guide format is intended to facilitate the development of project requirements and designs by dealing with major criteria on both a general and specific level.

b. Chapter 2 provides an overview of the required individual spaces and buildings required for a complete and useable facility. Chapter 3 provides guidelines for developing the overall design of the facility. Chapter 4 provides guidelines by discipline for the building systems.

c. Illustrations in this guide represent possible applications of the criteria and are not intended to be definitive. The Design Agency is encouraged to be creative throughout the design process. Local conditions, codes and specific project requirements shall be major design considerations in the development of a total, integrated facility.

#### 1-4. Responsibilities.

a. The Using Service is responsible for:

(1) Determining functional requirements.

(2) Approving functional requirements that extend beyond the scope of this guide.

(3) Preparing and submitting project documentation (DD Forms 1390 and 1391 and supporting data) in accordance with AR 140-478.

(4) Approving concept designs to certify compliance with functional requirements.

(5) Developing additional information, as required, such as telephone needs, special electrical requirements and equipment specifications.

b. The Design Agency is responsible for:

(1) Incorporating the functional requirements of the Using Service into the project design.

(2) Developing a design responsive to the criteria in this guide and the project documentation.

(3) Justifying in the project design analysis any areas of design which do not follow this guide.

(4) Emphasizing the quality standards for the overall design as stated herein.

(5) Ensuring that the design is in compliance with applicable codes and standards.

(6) Preparing cost estimates (Current Working Estimates [CWE codes A, B, and C]).

c. The Supporting Installation is responsible for:

(1) All the responsibilities of the Using Service for Minor Military Construction Army Reserve (MMCAR) and OMAR construction.

(2) Providing the Design Agency with as-built drawings of existing construction.

(3) Providing an up-to-date and complete Backlog of Maintenance and Repair (BMAR) list.

(4) Providing a copy of all outstanding work orders.

(5) Providing a copy of the current 416th Engineering Command Survey Team's Report.

(6) Providing a condition survey.

## 1-5. Quality of design.

a. The Design Agency must seek design excellence through commitment to high standards. Success in achieving this objective lies not in the repetition of previous design solutions but in relating to the Using Service and responding to their specific needs.

b. The concept of total systems design will be emphasized in promoting the development of a functional, energy efficient and aesthetically pleasing building. Design concepts must evolve in a multi-disciplinary manner with regard to architectural, civil, structural, electrical and mechanical systems.

c. In evaluating the cost impact of design decisions, the designer will consider the life cycle cost effectiveness, not just the initial cost.

## 1-6. Mission and purpose of the U.S. Army Reserve.

a. The mission of the Army Reserve is to maintain a force of combat ready units for augmentation and expansion of the active force in time of need.

b. The Army Reserve accomplishes its mission by performing training. Therefore, a Reserve center is a training center.

(1) The individual soldier is given hands-on training in the skills of his job with particular emphasis on the operation and maintenance of equipment.

(2) Unit training is accomplished by progressively larger and larger elements to perform the mission as a team.

c. Every functional space in a Reserve center is intended to be primarily a training space. For example:

(1) The primary purpose of a kitchen is to allow cooks to train. The secondary purpose is to feed the troops.

(2) The primary purpose of the organizational maintenance shop (OMS) is to allow the training of mechanics. The secondary purpose is to maintain vehicles.

(3) The primary purpose of office space is to allow the training of clerical personnel. The secondary purpose is to do paperwork.

d. A Reserve Center is an institutional building with both community and national characteristics. The center is the home station for the local unit composed of individuals sharing experiences of personal action on behalf of the community much in the same way as a volunteer fire department. At the same time, as a U. S. Army installation, it represents the entire Army. Thus the design of the building must reflect the Reservist's feelings of patriotism, pride and community participation as well as a sense of the purpose of the

U.S. Army: to keep the peace by maintaining a strong and capable organized military force.

1-7. Program synopsis.

a. Chapter 3 delineates the functional and environmental requirements for most individual spaces within the training center and maintenance buildings. Not all projects include all of the spaces, nor are all of the possible types of spaces included in this design guide. Specific information on the types and sizes of spaces authorized are determined by the project documentation. The Design Agency will supplement the information in chapter 2 at the initial design conference.

b. A typical facility consists of two major components: the training center and related maintenance facilities.

c. The training center generally consists of four main functional groups: administrative, classroom, assembly and unit storage. Supporting these main functional groups are general and special support areas. Within each group are subordinate functional areas which contribute to the operation of the group.

(1) The administrative group consists of office space, support space and training areas:

(a) Exclusive office space is dedicated space for unit supervisors and full time employees.

(b) Common office space is shared space for non-supervisory unit administrative personnel. This space will be used by different units on different drill weekends.

(c) Support space includes such functions as message centers, reproduction rooms, conference rooms, retention offices and administrative storage.

(d) Special areas include such areas as drafting rooms, medical wings and photo labs.

(2) The classroom group consists of classrooms, library, audio-visual learning center, communications security storage/classroom and training aid storage. These areas provide instructional space for reservists during weekend training periods and testing areas for potential members.

(3) The assembly group consists of the assembly hall, food service and table and chair storage. The main element of the assembly group is a multi-purpose space for assembly. The hall serves as a large classroom, a practical training area, a dining room, and for drill and ceremonies. Related areas consist of food service facilities, and table and chair storage.

(4) The unit storage group consists of unit supply rooms, unit storage rooms, unit supply offices and unit locker storage rooms. This group is closely related to the assembly group which provides the training space for use

of the equipment issued from the storage group.

(5) The training center also contains general support areas and special areas on a special allocation basis.

(a) General support areas include toilets, mechanical equipment, electrical equipment, telephone equipment, janitorial and facility maintenance storage.

(b) Special areas include indoor rifle ranges, tank turret trainers, simulators and large, high bay equipment, indoor training areas.

d. Maintenance facilities consist of organizational maintenance shop (OMS), direct support and general support maintenance shop (DS/GS), an area a maintenance support activity (AMSA) and a maintenance branch of equipment concentration site (ECS).

(1) These facilities may be collocated with a training center and with each other. When collocated, workbays will be shared.

(2) OMS and DS/GS Shops are used primarily to train reserve mechanics, although some full time employees may be assigned to these facilities. The ancillary shop areas for AMSA, such as the shop offices, tool rooms, flammable storage, battery rooms, mechanical rooms, custodial areas and work bays are similar to those of OMS in functional requirements; therefore, refer to the OMS individual space criteria in section 3-8 for these similar AMSA spaces. In addition to these standard areas, AMSA is often authorized additional special maintenance offices, such as a small arms repair and electronic/communications repair. In conjunction with the small arms repair, provide either a safe or an arms vault constructed according to the same standards as the arms vault in the training center building. Since the AMSA is staffed by full time employees, a break room, locker rooms and toilet rooms will be provided.

(3) AMSA and ECS maintenance facilities have the same requirements and will both be referred to as AMSA. These shops are used primarily to service vehicles using a full time staff. The bulk of maintenance work is performed in these shops (Table 1-1).

**TABLE 1-1. Common AMSA configurations.**

Operation	Configuration
(1) Separate location, supporting USAR units in a geographical area.	AMSA building, asphalt military equipment parking (MEP) area, and privately owned vehicles (POV) parking area.
(2) Collocated at USAR with OMS, supporting USAR units in geographical area.	AMSA/OMS building (work bays shared), MEP area. (POV parking shared at facilities).
(3) Separate location, supporting only an ECS.	AMSA building, MEP area, POV parking area (other ancillary facilities only as provided for on project docu-

e. An ECS is a large storage site with outdoor parking areas and enclosed warehousing of military equipment. The ECS is located at a military installation. The ECS is designed not only to store equipment but also to efficiently issue and return equipment used in training exercises. Facilities which may be associated with an ECS, as provided for in the project documentation, are the parking hardstand, fuel dispensing system, loading ramp, wash platform, indoor equipment storage warehouse, combat vehicle arms vault, fencing, security lighting and an AMSA.

## CHAPTER 2

## PLANNING GUIDELINES

2-1. Design criteria and application. The two main documents submitted to the designer, prior to beginning design for a facility, are the Project Documents and this guide. The program lists the spaces and respective square footages for a specific project. This guide provides design criteria and application guidelines which will be used in the development of the project. Figure 2-1 illustrates how the Project Documents and the Design Guide are related. Use of these two documents will help the designer to quickly produce the schematic design and design development of the proposed facility.

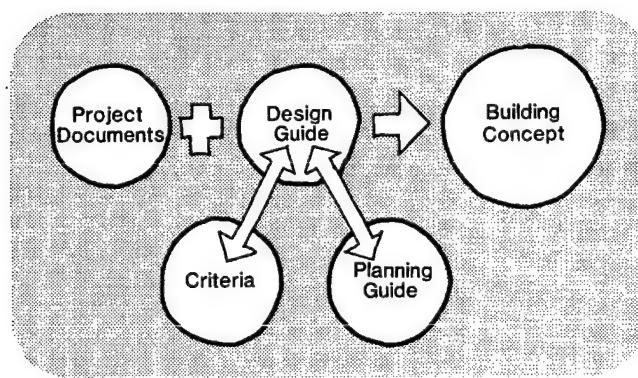


Figure 2-1. Project design development.

2-2. Site planning.

a. A facility must fit well into the surrounding environment, accommodating existing and future development. Selection of the most appropriate site is based on the following site characteristics:

- (1) a relatively level site, suitable for the parking of military training vehicles.
- (2) a high public visibility of the training center building.
- (3) a buffered area of the site should be available to mask the noise and disruption caused by exterior training exercises and military equipment usage.
- (4) an easily accessible site (Figure 2-2).

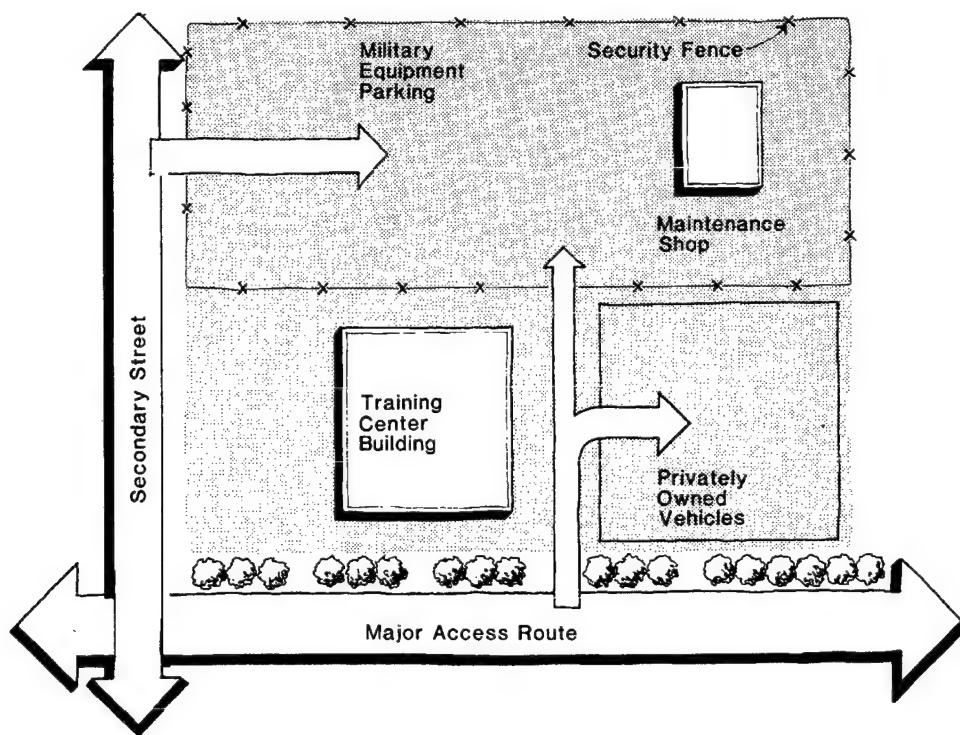


Figure 2-2. Site access.

b. The training center building, due to its high usage and the desire to provide high community visual presence, will be located on the most exposed side of the site (Figure 2-3). The POV parking area is best located behind or adjacent to the training center building. The OMS/AMSA is an individual structure located away from the training center building to minimize noise and disruption (Figure 2-4). Typical site layouts are shown in figures 2-2 through 2-5.

c. Painted striping will be provided in the POV and MEP areas, and planted islands should be avoided. Raised asphalt or concrete curbs should not be provided unless required for erosion control. Sidewalks will be planned from all building entrances to the POV and MEP areas; sidewalks in the parking areas should be avoided. Refer to AR 140-485 for parking lot design criteria.

d. Fencing is always provided for the MEP area. Fencing may be provided for the Training Center, by exception, for security considerations.

e. Provide an aluminum flagpole for each Reserve Center.

f. Refer to TM 5-803-5, chapter 3 for additional site planning considerations.

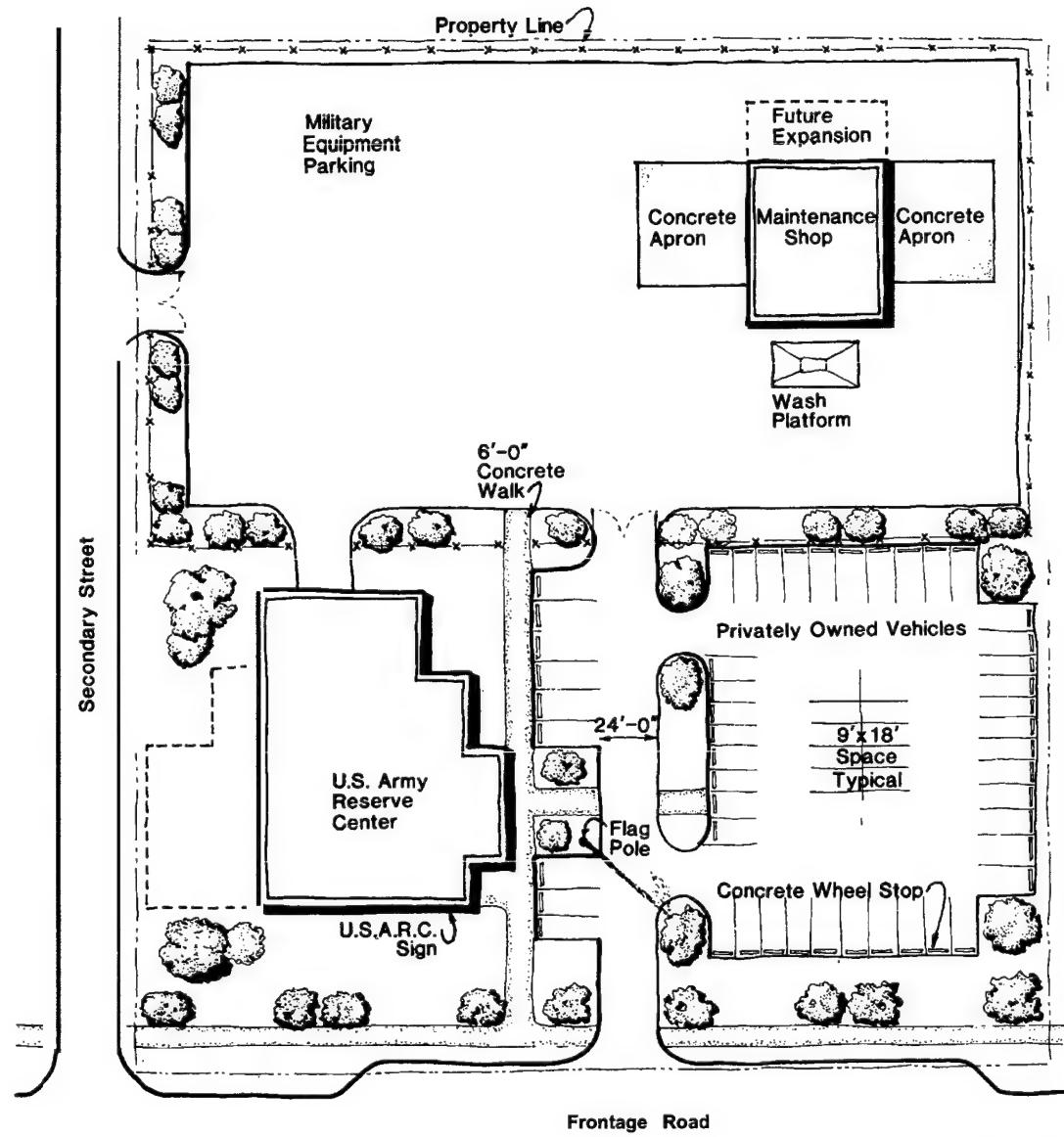


Figure 2-3. Typical site plan.

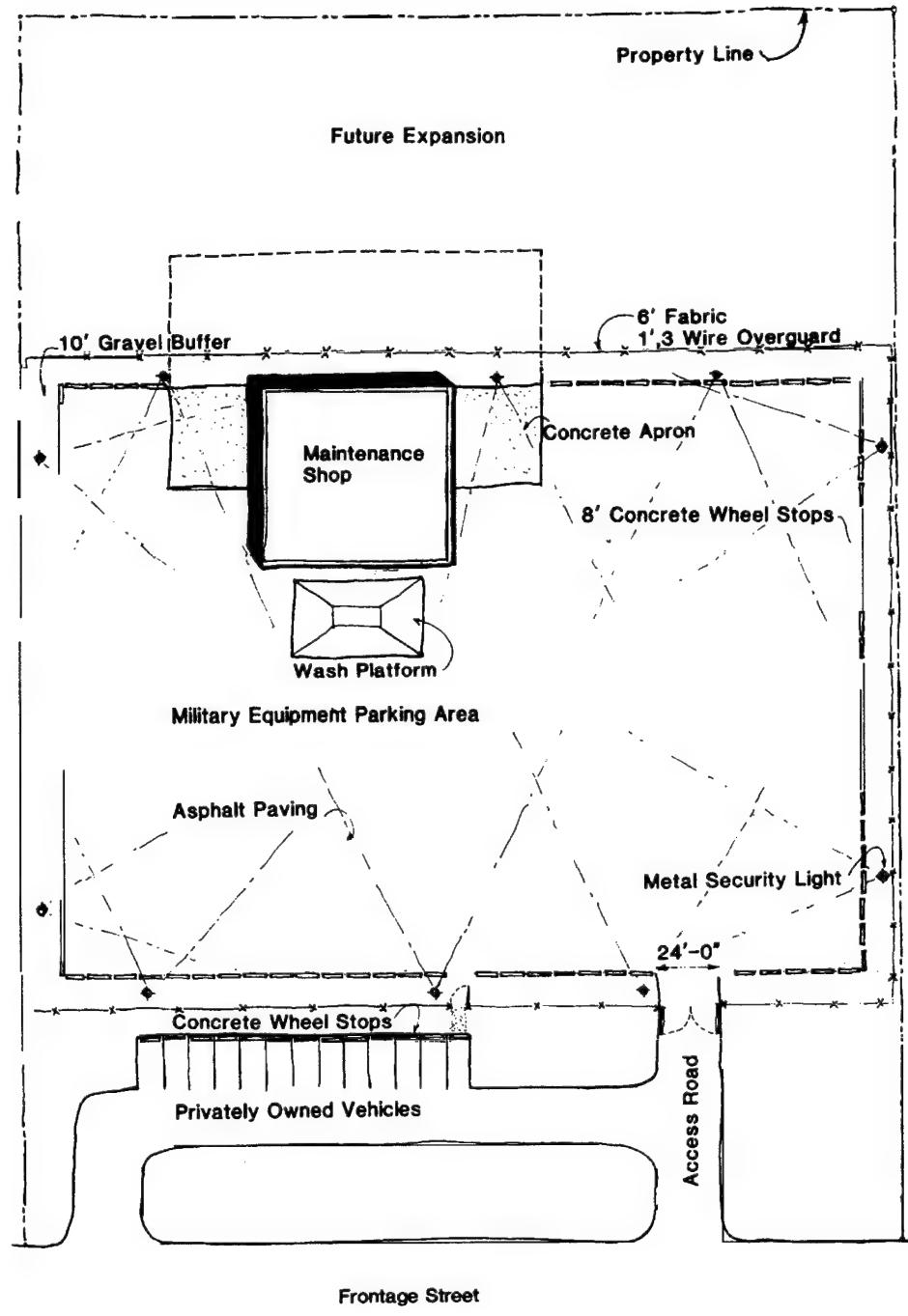


Figure 2-4. Area maintenance support activities (AMSA).

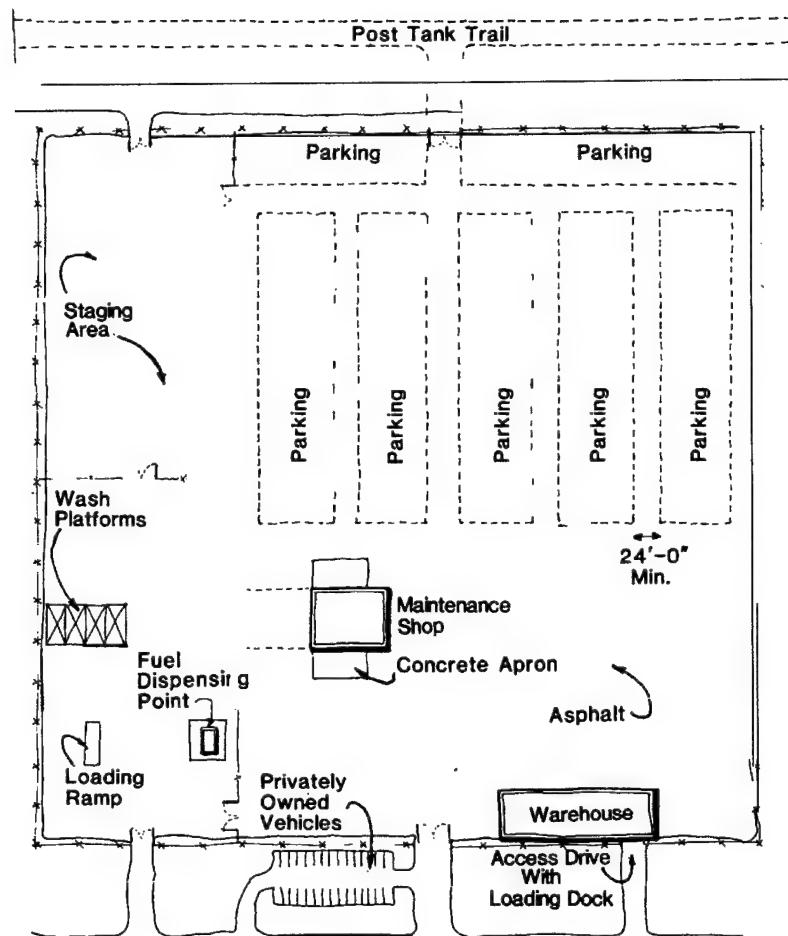


Figure 2-5. Equipment concentration site (ECS).

## 2-3. Landscape design.

a. Landscaping must be an integral part of the facilities design. Good landscape design affords many valuable benefits.

(1) Architectural character is supported by proper landscape design which introduces color, texture, form, etc., to the living environment.

(2) Traffic direction induced by design of planted areas can reduce the need for supplemental site graphics.

(3) Erosion control lessens adjacent environmental impact.

(4) Landscaping provides environmental buffers from harsh winds, intense solar conditions, and poor visual panoramas.

(5) Positive outdoor spaces are created by planned landscape design.

b. The plant and tree selection must be of a quality to afford permanent low maintenance vegetation appropriate for the facility's location. The vegetation must be able to be maintained with a minimum effort, be vandal resistant (or be of a nature which does not encourage vandalism) and be disease resistant and climatized to the area. The plant materials should also be appropriate for the proposed planting area. Consideration should be given to adjacent structures and improvements such that the landscaping does not adversely impact them (Figure 2-6). Trees should be carefully selected to prevent clogged gutters and drains during autumn and blocked sewer lines due to root damage. Refer to TM 5-803-5 for landscape design considerations.

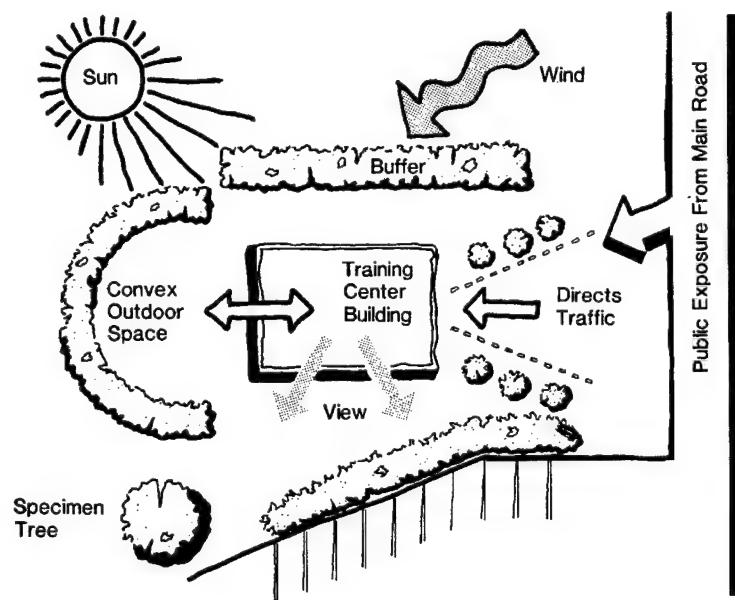


Figure 2-6. Landscaping.

## 2-4. Architectural style and character.

- a. The military facility, by its presence, represents national security, strength, austerity, efficiency, professionalism and pride in country and community.
- b. The architecture must be sensitive to the style, scale and materials of the local region not only for aesthetics but also for function. Many local building forms and design statements are a direct outgrowth of a region's environmental and cultural characteristics. Trendy designs will be avoided.
- c. The facility's style should blend into the existing architecture of the surroundings. The character should evoke a sense of pride in the nearby neighbors as well as the entire community.
- d. Materials will be selected that are aesthetically pleasing and cost effective.

## 2-5. Interior design.

- a. The interior environment must respond to the needs of the facility as well as the individuals who occupy it and will be functional, aesthetically pleasing and cost effective. In addition, the interior environment should provide a humane setting which promotes a sense of belonging and well-being for the personnel. The following sections provide criteria that will be considered to meet these goals.
- b. The interior environment will be developed in coordination with the architectural design. All features of the building, including moveable furnishings and equipment (whether or not a part of the construction contract), will be coordinated as parts of the overall design concept.
- c. Through the planning process, the nature and configuration of the space can be examined. The adjacency requirements between the functional elements of an organization, adjacency priorities, work flow and patterns of communication will be initial considerations in the design process. Other factors will include multiple use of space and flexibility for future uses and growth. Overall, the primary goal of space planning is to convert functional program requirements into a workable, aesthetically pleasing environment.
- d. Materials and finishes may be selected for external appearance alone, but they will ultimately affect the acoustical, lighting, insulating, fire-rating and maintenance factors of an environment. Any selection must satisfy aesthetic and functional requirements regarding durability, wearability and maintenance. To a great extent, materials and finishes have been predetermined for a facility. A summary of scheduled items can be found in chapter 3. Where selection options have been authorized, the above criteria shall be considered.
- e. Emotional responses are, to a great extent, the product of color and its character and quality as encountered within the environment. These responses are influenced by the viewing conditions, the use of color on surrounding

objects and surfaces, and the size and relationships of these factors. Color can stimulate the imagination and create, attract, and maintain interest. Handled knowledgeably, imaginatively, and wisely, it is one of the most economical, yet psychologically satisfying and successful elements of the interior environment.

f. Specification of proper furnishings is critical to the performance and operational success of any facility. The standard criteria by which quality and appropriateness may be evaluated include function, moveability, adjustability, maintenance, durability, comfort, and cost. Procurement of furnishings is the responsibility of the assigned units. However, a layout will be prepared at the 10 percent design level to show circulation patterns and facilitate electrical and mechanical designs.

2-6. Flexibility and economy of design.

a. Internal flexibility will be planned to absorb much of the growth and change of the facility over the years as units change their training emphasis. For example, a facility may be oriented to infantry training and then, after a period of time, may be changed to a medical unit. This may require additional maintenance/shop space and a decrease in the unit storage area. If a facility is designed with internal flexibility of building systems, it can accommodate change without undue expense. Therefore, the office design should not be too closely tailored to the units currently assigned but should be a generic office design providing a balanced ratio of exclusive office space to common office space (Figure 2-7).

b. External flexibility will also be planned to accommodate the growth of a facility. This requires proper siting and utility planning and a building systems approach to design, universally applied to the facility.

c. Economy of design will be taken in its broadest sense: initial cost, maintenance and building system flexibility. Consider the following flexible building systems:

(1) Architectural: Floor to ceiling remountable partition construction, ceiling system continuity to allow future partition flexibility, modular carpet, etc.

(2) Structural: Steel or concrete post and beam or pan/joist construction for greater interior space planning flexibility.

(3) Mechanical: Universally flexible systems such as variable air volume, expandable systems, use of multiple systems, etc.

(4) Electrical: Flat conductor cable for electrical and telephone distribution, flexible lighting and electrical systems compatible with flexible ceiling grids.

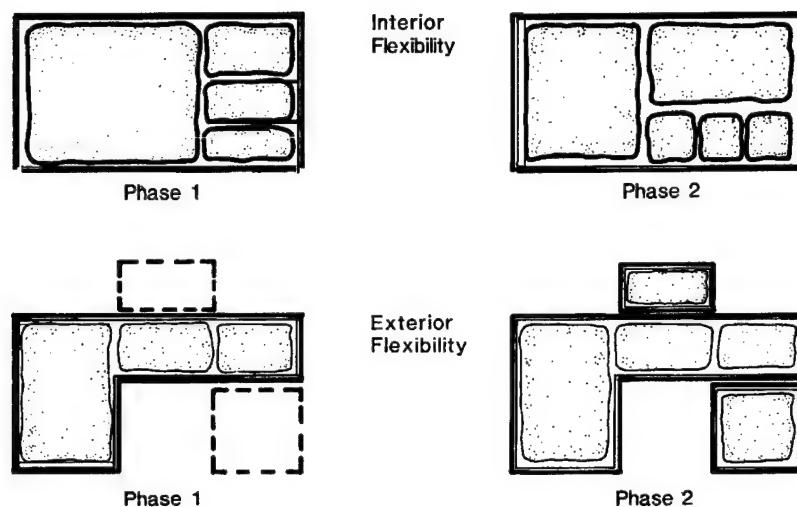


Figure 2-7. Flexibility.

## 2-7. New construction, alterations and additions.

a. The criteria and requirements contained within the guide pertain to all three types of projects: new construction, alterations and additions. All three must conform to the requirements here and in DOD 4270.1-M. It is recognized, however, that due to the architectural configuration of the existing facilities and the remaining life of its systems and other considerations, it may not be feasible in alteration projects to meet all new construction standards. Professional judgment is required to design a building which combines old and new portions into a harmonious finished design to provide a complete and useable facility at the lowest life cycle cost. As soon as possible after design initiation, a detailed facility investigation will establish the limits of construction. These limits will be stated in narrative form along with a checklist of required repairs/demolition to be included with the preconcept (10 percent) submission. Investigations will include the following:

- (1) Review required real property maintenance and repair work. Consult the facility manager and the support installation (BMAR) list.
- (2) Verify accuracy of as-built drawings.
- (3) Determine adequacy of supporting utilities.

(4) Determine the status of the following building components: structural, fire protection, electrical, plumbing, and HVAC systems; windows; roof; exterior and interior walls; doors and hardware; stairways; insulation.

b. Radiation protection requirements: There is no requirement to analyze existing facilities for fallout shelters since they have been surveyed by the Federal Emergency Management Agency. If a new addition is being provided, it must be determined if the addition will provide significant increased protection. If this is the case, the additional shelter space meeting protection factor (PF) 40 and above will be identified. No additional construction cost will be authorized to meet this criteria.

c. Economic studies - exceptions. A life cycle cost (LCC) based, economic study responsive only to the general requirements of DOD 4270.1-M. is not required in the following situations:

(1) When it can be shown that the study itself is not likely to prove to be cost effective.

(2) When the relative economic ranking of the various alternatives under consideration has already been established for similar design situations.

(3) When the total projected cost of the study for any particular design feature, if added to the cost of the economic studies already conducted or planned for other design features, would exceed one percent of the programmed amount (PA) for the project. For example, the total cost of economic studies for a project having a one million dollar PA could not exceed \$10,000.

## CHAPTER THREE

## INDIVIDUAL SPACE CRITERIA

## Section I. SITE DEVELOPMENT

## 3-1. Site work.

a. The standard facility consists of the training building, the organizational maintenance shop (OMS) with military equipment parking (MEP) area and the privately owned vehicle (POV) parking area. The inter-relationship of these spaces and their appropriate site orientation require careful study. As the major point of activity and public access, the training center building dominates the community interface of the entire facility and must be visible from adjacent public areas. The MEP and OMS also must be located near the training center building for economical accessibility and to afford a showcase for public relations purposes.

b. Site access must be direct, safe and efficient to minimize the environmental impact of military vehicle traffic. The design should minimize access points but provide adequate acceleration and deceleration lanes at the entrances. Standard traffic planning practices will be adhered to. Access and paving material may be concrete or asphaltic concrete. Curb and gutter improvements will only be provided for erosion control or other safety requirements. Sidewalks will be provided from POV parking areas to the building entrances. Keep POV and military traffic separated.

c. Security lighting will be provided in the MEP and at training building entrances. Lighting will not be provided in the POV area, unless justified on the basis of high crime security. The MEP illumination level will be 2 foot-candles with a minimum intensity of .04 footcandles.

d. Wash platforms will be designed to collect and pretreat all runoff prior to discharge into a central sewerage system. Pretreatment facilities for runoff usually consist of a sand trap and grease/oil interceptor; however, the degree of pretreatment will be determined by the project location and environmental requirements of the federal, state and local government. User requirements and local factors such as vehicle types and frequency of use, regional soil characteristics, maximum water flow during washing, and the resources available to clean and maintain sand traps and grease/oil interceptors will also be considered. Ease of maintenance will be a prime consideration in the design of a wash platform. The use of high pressure, low volume cleaning equipment is highly recommended, because it greatly reduces the amount of runoff to be treated and therefore simplifies the design of the wash platform and pretreatment facilities.

e. Maximum use of existing site features will be made to enhance the aesthetics of the building as well as minimize the cost of earthwork and landscaping when compatible with the functional requirements of the new site development. Where necessary, additional low maintenance landscape planting should be provided to supplement the existing site features and enhance the

attractiveness of the project. Existing soils will be conditioned for seeding by the use of additives in lieu of bringing in topsoil from off-site sources. Hydroseeding may be permitted. Sodding will be provided only on areas subject to erosion. Careful evaluation of all natural and man-made features on the site will be made to determine whether retention or demolition of the existing features is more economical. Consideration of the possible future needs for expansion will also be included in this cost evaluation.

f. Provisions for future expansion must be designed into each project, especially new centers. In the training center buildings, expansion will primarily consist of administrative, classroom and unit storage spaces. The OMS will be sited to allow for the construction of additional work bays. MEP and POV areas will be sited to accommodate increased parking requirements associated with increases in personnel and equipment.

g. In addition to minimizing the length of utility lines to reduce construction cost, efforts should be made to locate lines to provide easy access for future maintenance and expansion. The utility lines should also be sited to prevent damage by vehicles and personnel and to avoid any adverse effect upon the facility's aesthetics or that of the surrounding neighborhood. The utilities must be designed with the requirements of the total complex in mind to ensure a complete system which can operate as an independent unit dealing directly with the municipal utility companies.

h. It is important that the site development blend into its surroundings in such a way that it becomes an asset to the community. An attractive, well organized facility can gain acceptance and cooperation from the local neighborhood and businesses. The use of trees and vegetation not only provides beauty, shade and protection, but also provides a screen to blend equipment parks, maintenance areas and POV parking areas into the surroundings, resulting in a more compatible and attractive facility.

## Section II. TRAINING CENTER BUILDING

### 3-2. Circulation.

#### a. Lobby.

(1) Function. The lobby provides an entry way and reception area for unit personnel and visitors. It is one of the first image-makers provided and should reflect feelings of pride and commitment characteristic of the U.S. Army Reserve.

#### (2) General design requirements.

(a) As the primary public entrance to the training center building, the entry must be readily identifiable from the parking lot and pedestrian access routes (Figure 3-1). The lobby must be adjacent to a permanently staffed office since there is no receptionist. The design should provide an ordered, warm, friendly invitation to the public (Figure 3-2).

(b) Functional parameters include clearances to accommodate circulation, traffic patterns and space for standing. The entrance should have an adequate exterior overhang or vestibule. Maximum body width and breadth (generally a 24-inch by 24-inch area) is a key module for designing this space.

(c) Graphic displays, such as units' placques, trophies and awards, should be placed in a visually prominent location.

(d) Acoustical ceilings will be installed with hold-down clips in vestibules and entry areas where a change in air pressure might cause the tiles to move.

(e) Provide entrance ramp for handicapped access.

(3) Equipment. Furnishings will be determined by the individual unit. Seating will not be provided.

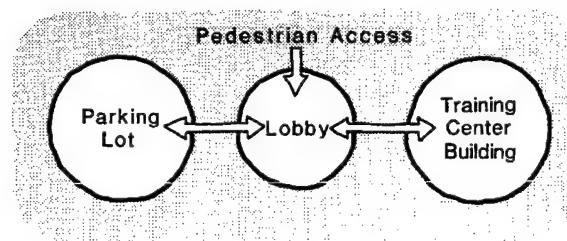


Figure 3-1. Lobby adjacency diagram.

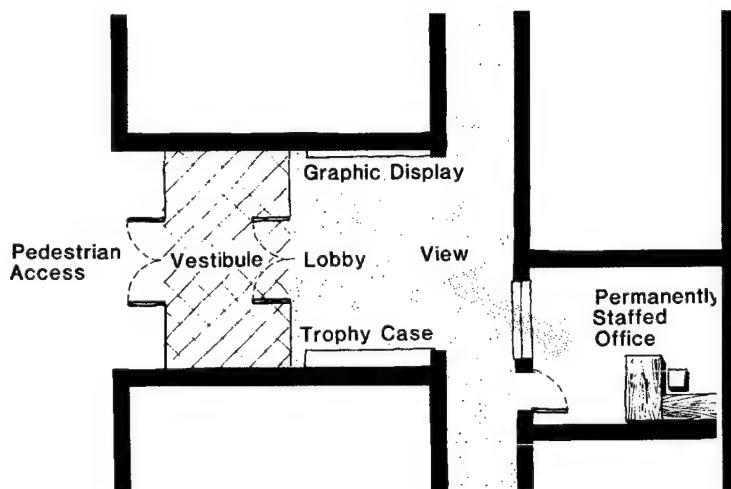


Figure 3-2. Lobby plan.

b. Corridor.

(1) Function. The corridor is an interior passageway providing access and egress within the building.

(2) General design requirements.

(a) The standard clear width will be 6 feet for major circulation corridors. Secondary corridors may be reduced to 5 feet. Corridors should provide a double lane clearance that allows two people abreast to circulate comfortably without body contact.

(b) Corridors will be planned to be a maximum of 150 feet straight in one direction. Consider changing corridor direction and providing views to adjacent spaces or an exterior scene. Permanent wall mounted fixtures such as drinking fountains or fire extinguishers must not project" into the corridor (Figure 3-3).

(c) Exit lighting should be wall-mounted rather than suspended from the ceiling whenever possible.

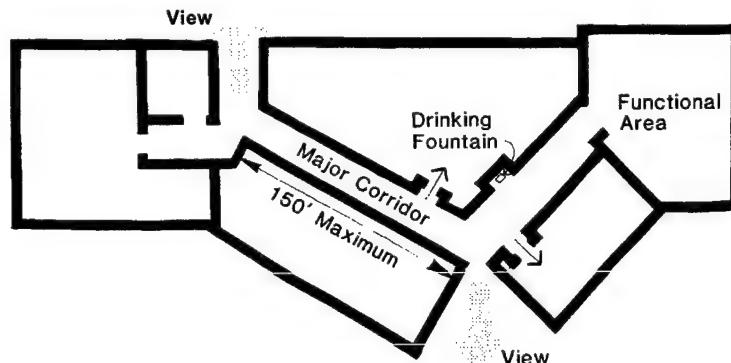


Figure 3-3. Corridor plan.

(3) Equipment. One wall mounted drinking fountain for every 100 persons will be provided.

3-3. Administrative areas.

a. Administrative offices.

(1) Function. The administrative offices are divided into two specific categories-- daily administration by permanent personnel and periodic administration by Army Reserve personnel consisting of exclusive use and common use areas.

## (2) General design requirements.

(a) As illustrated in figure 3-4, the exclusive use and common use spaces should be planned in a doughnut shape with the common use space approximately 1500-2000 square feet, surrounded by exclusive use space. If a larger multi-purpose space is required, it is better to provide an additional doughnut shape rather than to provide a single larger common use space greater than the 1500 square feet minimum dimension. Communication outlets and power receptacles should be primarily located on the perimeter walls. Floor outlets will not be used.

(b) Permanent personnel must be located adjacent to the main entrance of the building for visual control of visitors (Figure 3-5). A viewing window, such as a sidelight or full light in the door, will be provided for a view of the entrance from both a standing and seated position. The size of the glass will be in accordance with applicable safety codes.

(c) The design of the exclusive use and common use space should take into consideration the size and quantity of desks and other furnishings to be used as well as the primary and secondary circulation space required (Figures 3-6 and 3-7). Planning concepts should maximize the efficiency of space utilization.

## (3) Equipment.

(a) Exclusive use space will be furnished under a separate contract, with a worksurface or desk, shelving, filing, a small conference table, one desk chair and two guest chairs. All chairs in these offices will be on casters for ease of movement.

(b) The common use space will be equipped, under a separate contract, with moveable desks and seating. Desk sizes and shapes will be determined by equipment requirements, for example, a secondary surface will be provided for typewriters when necessary. Exact equipment and storage requirements will be verified by the Design Agency.

## (4) References. Refer to 3-3h, Computer equipment.

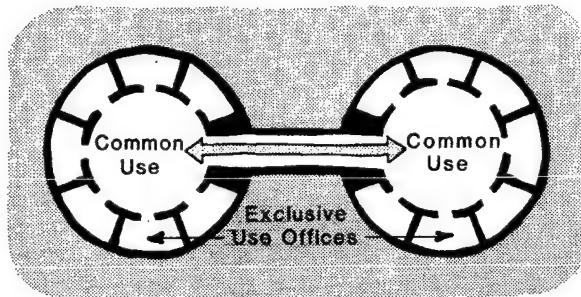


Figure 3-4. Exclusive use and common use doughnut shape.

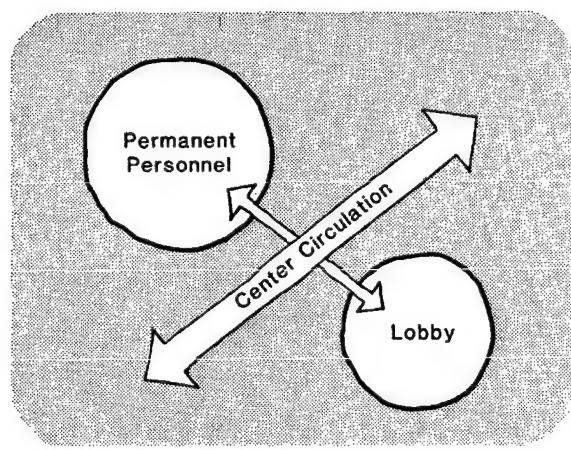


Figure 3-5. Permanent personnel adjacency diagram.

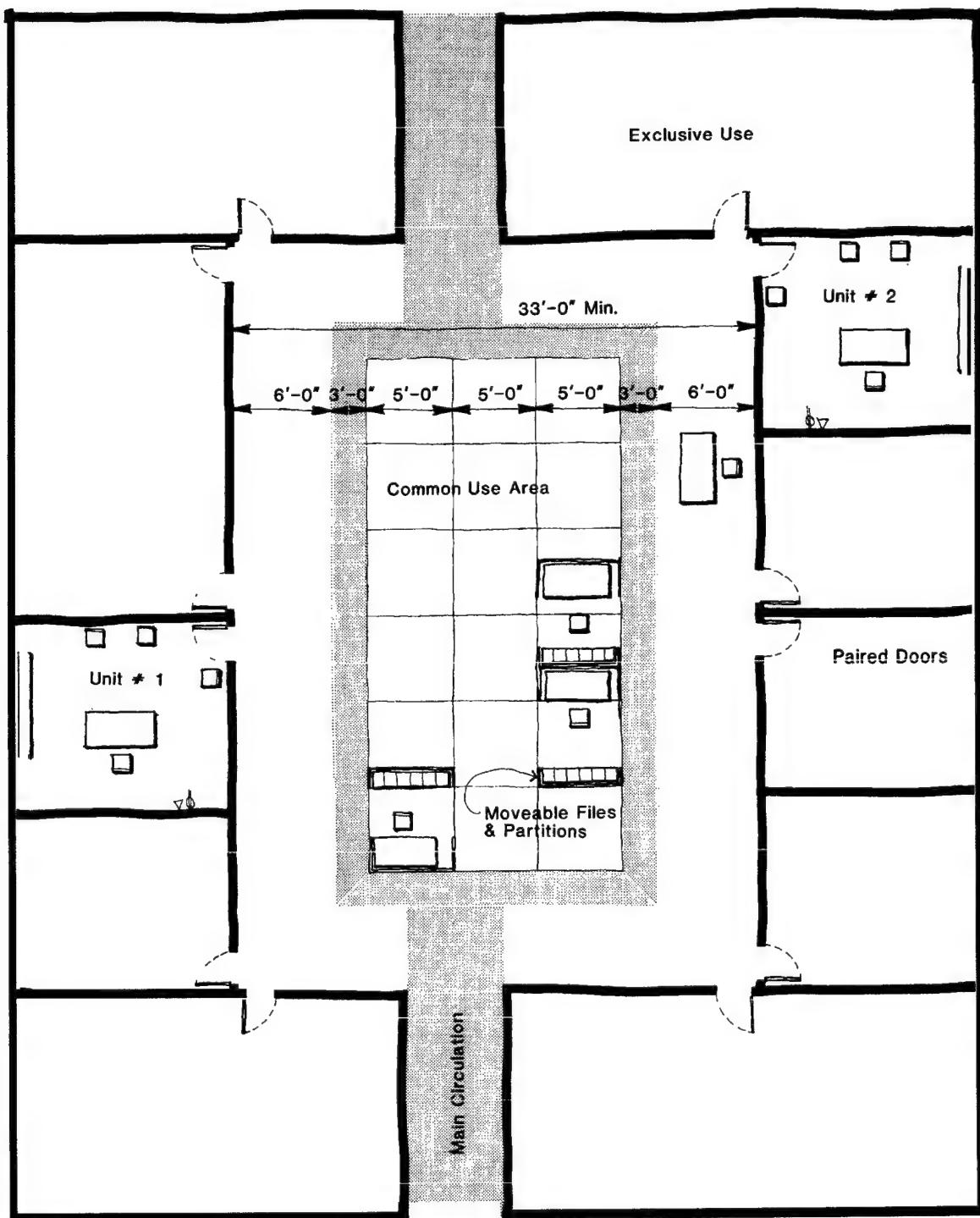


Figure 3-6. Common use plan.

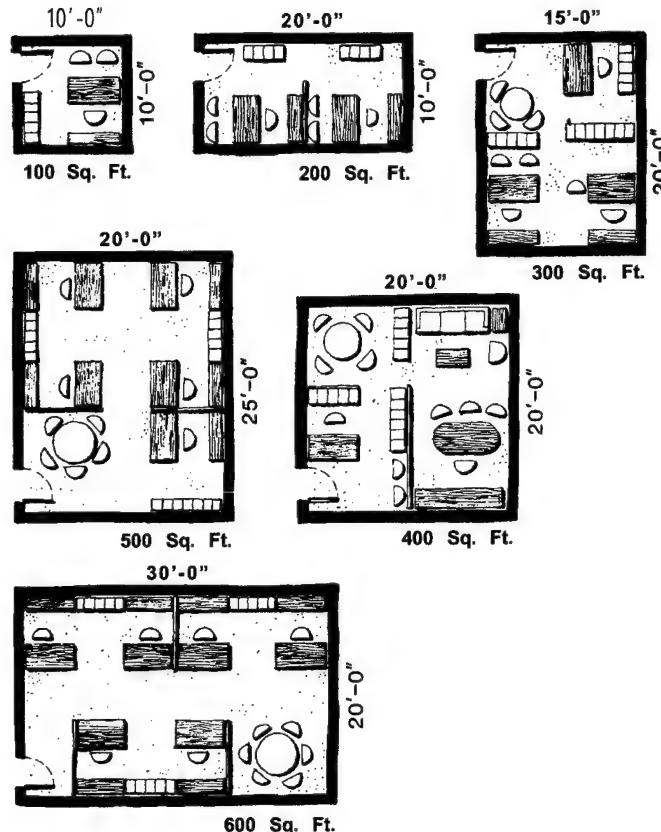


Figure 3-7. Exclusive use plans.

b. Retention office

(1) Function. This space is for permanently assigned personnel and is used primarily for administrative purposes. This space is also where potential members and re-enlistees are interviewed. The retention office must be easy to locate and adjacent to the main entrance (Figure 3-8). This space is shared by all assigned units.

(2) General design requirements. An office large enough to accommodate two full time personnel will be provided. Glazed panels (door or sidelight) may be used to emphasize public accessibility (Figure 3-9).

(3) Equipment. Moveable furnishings will be provided under a separate contract and include two primary worksurfaces and one or two conference tables as required. In some cases, personnel can share a table for meeting purposes. The worksurface area will include space for filing and shelving.

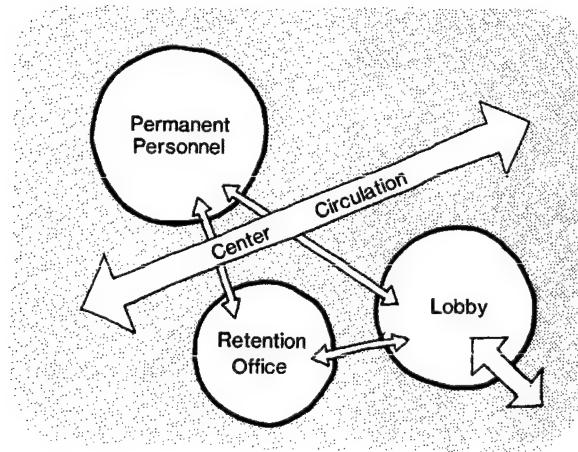


Figure 3-8. Retention office adjacency diagram.

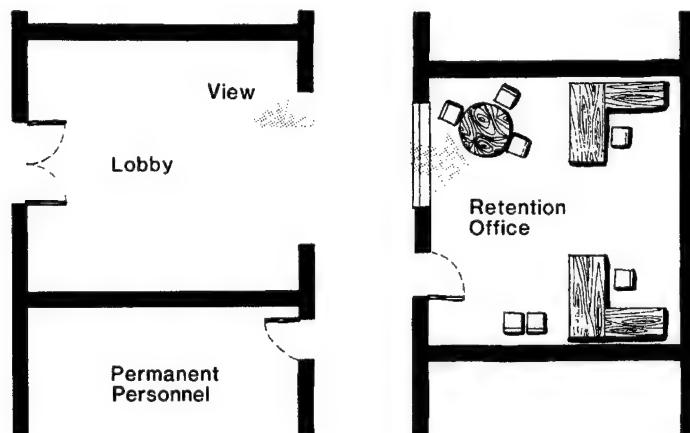


Figure 3-9. Retention office plan.

## c. Conference.

(1) Function. This space is used for meetings by the Commanding General and/or staff within the general office or headquarters; it is not provided for every facility.

(2) General design requirements. The design for this space should accommodate twenty people and should be adjacent to the Commander's office and permanent administration space (Figure 3-10).

(3) Equipment. Tables and seating for twenty people will be provided by others. Tables will be modular to allow for reconfiguration as needed. The actual dimensions of a conference table are a function of the number of

people to be seated (Figure 3-11). Generally, 30 inches per person constitutes a comfortable perimeter allocation. Tables to seat as many as twenty people may take on a "U" shape in an effort to reduce distances between people at opposite ends of the table and to economize on space utilization. These dimensions are not only important in establishing appropriate work zones but are essential in providing optimum sight lines when the room also incorporates an audio-visual wall. Spacing of people should minimize obstruction of sight lines. Clearances around the table for circulation should accommodate the maximum body breadth of the person seated and the space taken up by the chair itself. This seating zone varies from 18 inches to 36 inches. Therefore, the total dimension from table to wall or other obstruction, is between 48 inches and 60 inches. Distance from an audio-visual wall must be a minimum of 72 inches. Writing surfaces and tackable surfaces will be provided by the contractor.

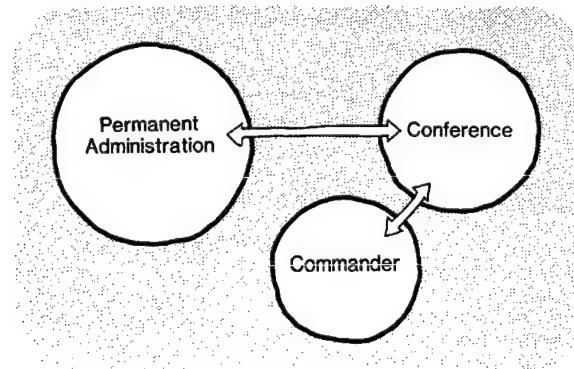


Figure 3-10. Conference adjacency diagram.

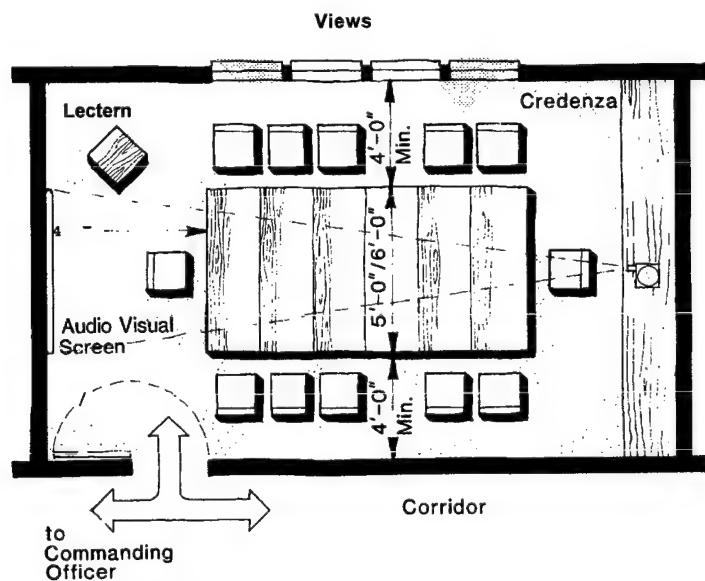


Figure 3-11. Conference plan.

## d. Message center.

(1) Function. The message center is the point for receipt and distribution of all inter- and intra-office correspondence. This space will not be staffed full time, but will provide a sorting and mail pickup area.

(2) General design requirements. The message center should be located adjacent to the administrative staff areas and close to the lobby (Figure 3-12). The message center should be enclosed and equipped with a lockable door and be rectangular in shape to maximize wall space. A pass-through window or dutch door will be provided to the corridor (Figure 3-13).

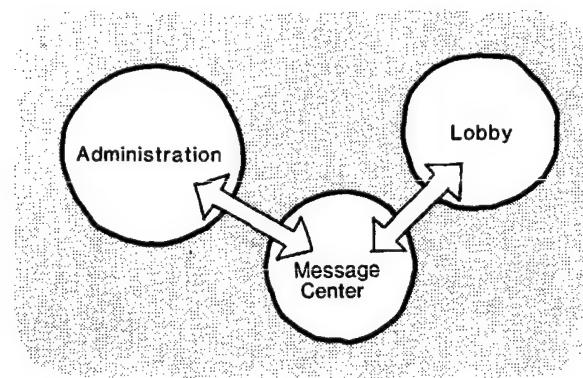


Figure 3-12. Message center adjacency diagram.

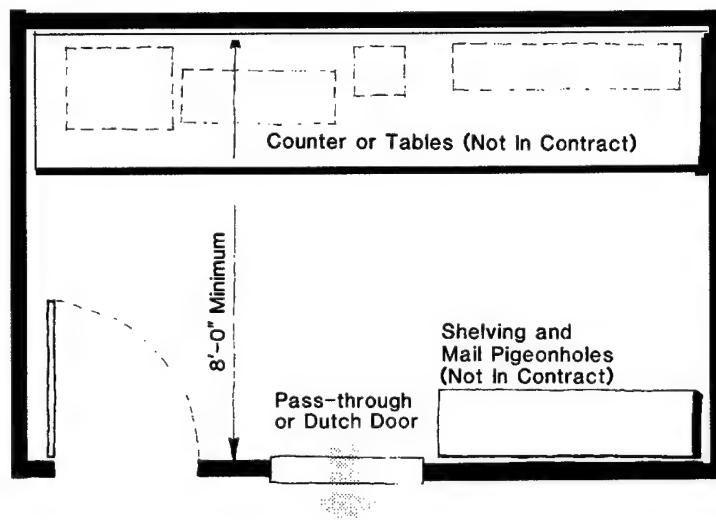


Figure 3-13. Message center plan.

(3) Equipment. The design should provide a worksurface for sorting and collating and pigeon holes for mail distribution. The number of bins will be determined by the size of the facility and number of units to be accommodated. Provide through-the-wall boxes.

e. Reproduction.

(1) Function. This space provides for the reproduction of administrative correspondence, bulletins, orders, etc. In some cases, the space also houses hard copy printers connected to word or data processing units in the office space. Diazo reproduction is not included.

(2) General design requirements. The reproduction space should be located adjacent to the administration space (Figure 3-14). The space must be large enough to accommodate a high-speed copier, a work table for collating and binding and sufficient storage for paper, toner, ink, etc. A small amount of storage should also be provided for office supplies and forms. The size of this area will be relative to the size of the unit and specific reproduction requirements (Figure 3-15).

(3) Equipment. A high speed copier will be provided by others. Table top equipment includes such items as a paper cutter and a variety of staplers. This equipment, as well as hard copy printers, will be outlined in the facilities' program.

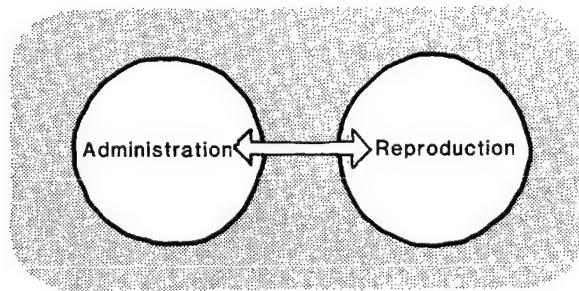


Figure 3-14. Reproduction adjacency diagram.

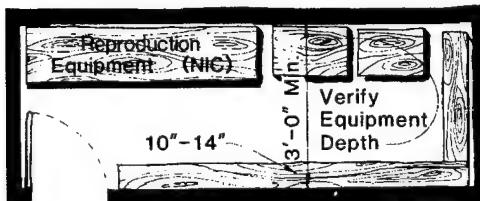


Figure 3-15. Reproduction plan.

## f. Drafting.

(1) Function. This space is provided for drafting operations and instruction.

(2) General design requirements. The drafting space does not require adjacency to any specific area. However, the drafting space should not be located adjacent to noisy spaces such as the assembly hall, rifle range, etc. (Figure 3-16). The design should accommodate four workstations (Figure 3-17).

3) Equipment. Workstations will be provided by others. Each should be planned to accommodate a drawing board 6 feet long by 3 feet wide and a layout surface approximately 3 feet wide by 6 feet to 7 feet long. Each space should include storage for drawing supplies. Flat file drawers, hanging racks for drawing storage and shelving for reference manuals should also be provided. Reproduction equipment may require ventilation.

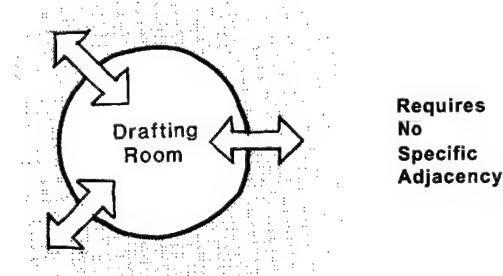


Figure 3-16. Drafting adjacency diagram.

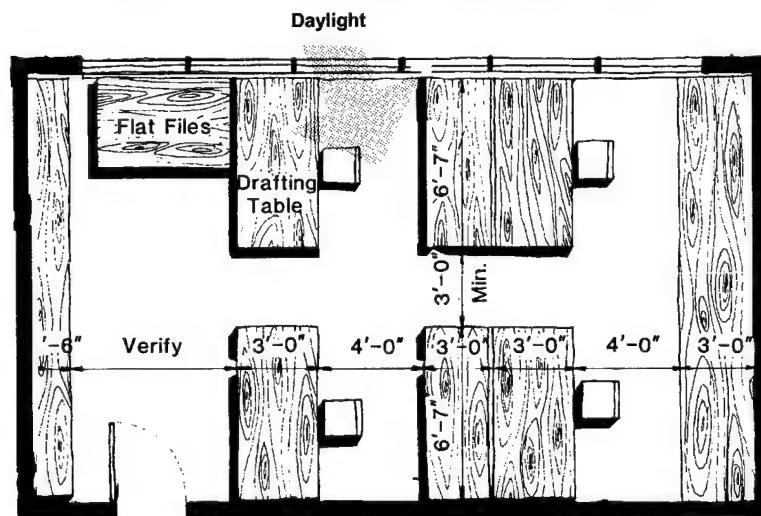


Figure 3-17. Drafting plan.

## g. Communications.

(1) Function. This space provides storage area for sensitive communica-

tion devices. However, a security safe may be substituted and placed within one of the classrooms.

(2) General design requirements. If a safe is placed in one of the classrooms, then the classroom design must provide sufficient space surrounding the safe for circulation and door operation. The safe must be offset from the wall 12 inches in order to open on two sides and swivel, thus requiring a slight increase in floor space. The door to the classroom must be lockable and without glazing (Figure 3-18). If the communications space is not incorporated in a classroom, then the space must be secure against surreptitious entry.

(3) Equipment. The only equipment involved is the safe, which will be provided by the Using Service. There are no structural considerations for this piece of equipment. One hundred pounds per square foot capacity is sufficient.

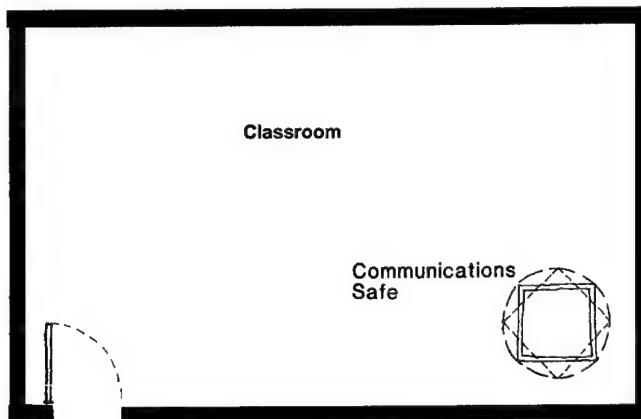


Figure 3-18. Communications plan.

h. Computer equipment.

(1) Function. Generally, the computer equipment will not require a separate space. The trend in the future will be towards locating this type of equipment in a decentralized manner; rather than providing the traditional computer room, equipment should be located with the users in the general office space with connections via communications cabling.

(2) General design requirements. Space should be provided to accommodate specific data and word processing functions as outlined in the program. The appropriate type of worksurfaces and their space requirements will be dictated by the equipment. Occasionally, printers may be remotely located in the reproduction area for acoustical reasons. Locations should be verified with the Using Service.

(3) Equipment. Types of equipment that are generally found in an office space are word and data processing terminals with keyboards, hard copy printers, personal computers, modems, control units and disk drive units. These may vary in shape, size and quantity, depending on the manufacturer and

the specific function required (Figure 3-19). The equipment needs will be included in the facilities' program.

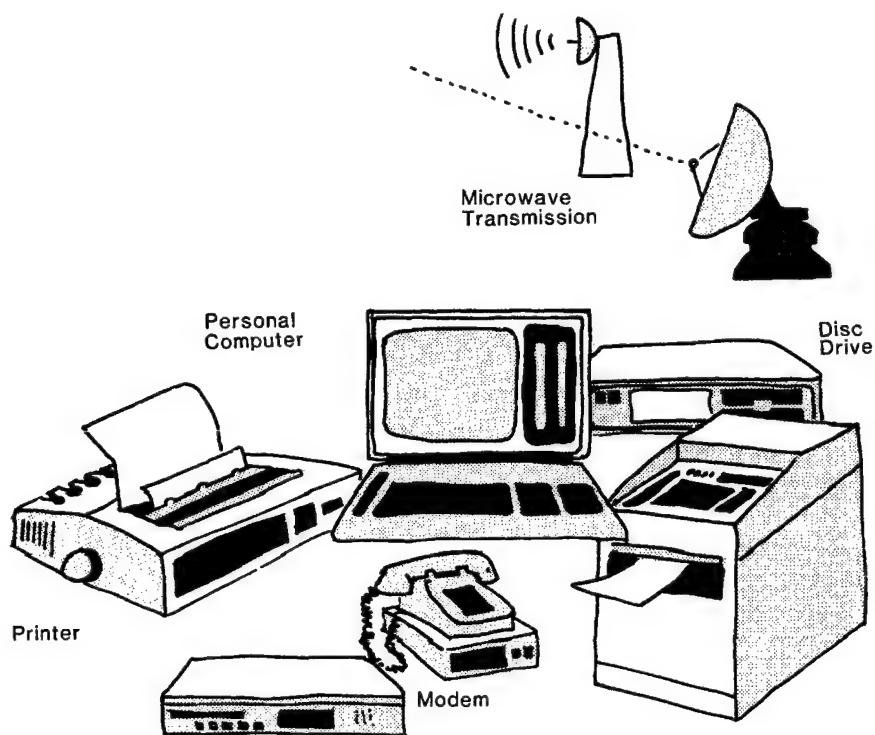


Figure 3-19. Computer equipment.

### 3-4. Classroom areas.

#### a. Classrooms

(1) Function. This space is used for instructional training of unit personnel.

(2) General design requirements. Classrooms should be located close to an outside entrance for easy access without going through the administrative area (Figure 3-20). Typically, 30 to 40 person classrooms will be provided at 20 square feet per person, with the rooms subdivisible by a moveable partition (Figure 3-21).

(3) Equipment. Provide a moveable partition with a minimum sound rating of 40 STC in classrooms to be subdivided. Acoustical treatment (sound attenuation blankets and acoustical sealant) should be provided above the ceiling at the folding partitions to attain a minimum of 40 STC and to eliminate all flanking paths. Each room should be provided with a chalkboard 8 feet wide by 4 feet high, mounted 3 feet from the floor. An additional chalkboard should be provided in the classrooms divided by folding partitions. Room darkening

shades or blinds should be provided for classrooms with windows. An additional lightswitch at the chalkboard location should be provided. Classrooms will be furnished by others with instructional type tables approximately 2 feet 4 inches wide by 6 feet long. Chairs should be stackable for ease of storage. An alternate plan could incorporate traditional desk-type seating (chairs with tablet arms).

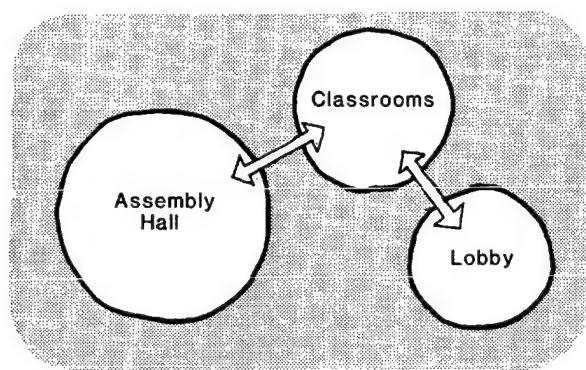


Figure 3-20. Classroom adjacency diagram.

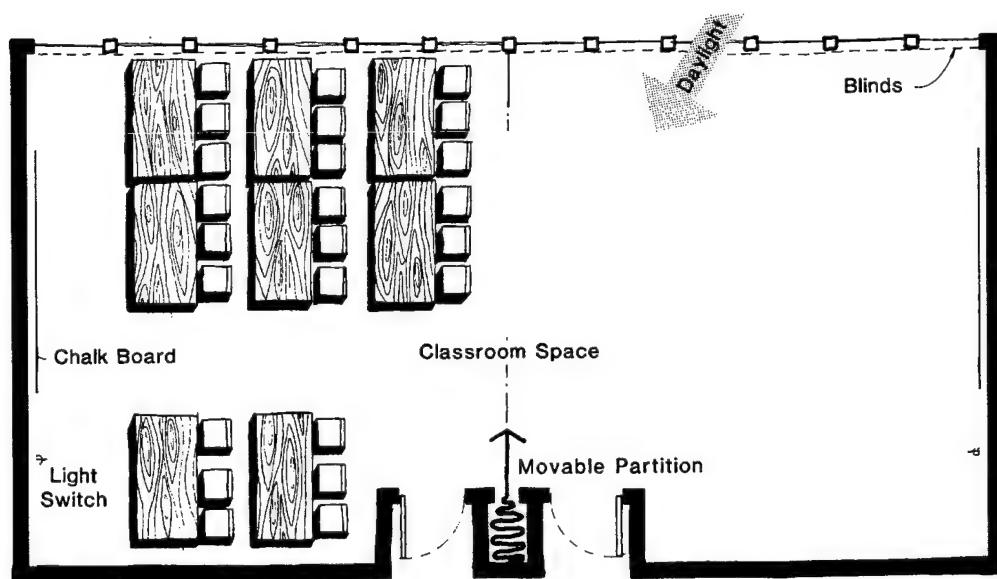


Figure 3-21. Classroom plan.

b. Learning center.

(1) Function. The learning center is a training area equipped with individual study carrels for military occupational specialty (MOS) training.

(2) General design requirements. The learning center should be adjacent to or combined with the library/classroom as required (Figure 3-22). Electrical outlets for audio/visual training equipment should be provided adjacent to the carrel.

(3) Equipment. The learning center function requires carrels equipped with audio visual training devices. Carrels will be free standing and will be provided and installed by the using service. The typical carrel size is 4 feet wide by 2 feet 6 inches deep. However, the actual dimension will reflect the equipment sizes outlined in the program.

c. Library/classroom.

(1) Function. The library/classroom accommodates training publications, reading material, a reading area and a small conference classroom for instructional training.

(2) General design requirements. This space may be combined with the learning center and should be adjacent to the other classroom areas (Figure 3-23). The configuration of this space will be based on a 3-foot book stack module. The typical corridor width between book stacks is also 3 feet.

(3) Equipment. The learning center will be provided by others with moveable book stacks, study table(s) and chairs, a small card index, dictionary stand and a map case. Quantities of books to be stored will be verified by the Design Agency. The conference/classroom shall be provided with one table to

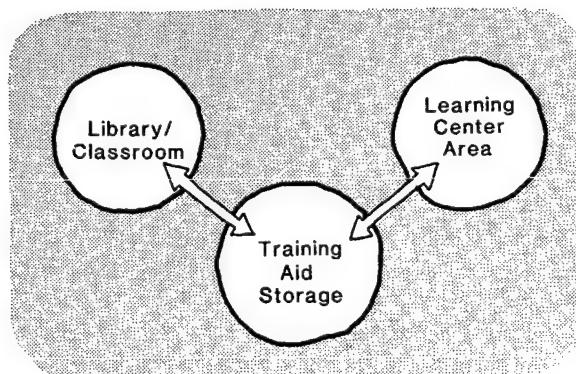


Figure 3-22. Learning center and library/classrooms adjacency diagram.

seat 6 people and a surface mounted combination chalkboard and tackboard, 8 feet wide by 4 feet high, mounted 3 feet above the floor.

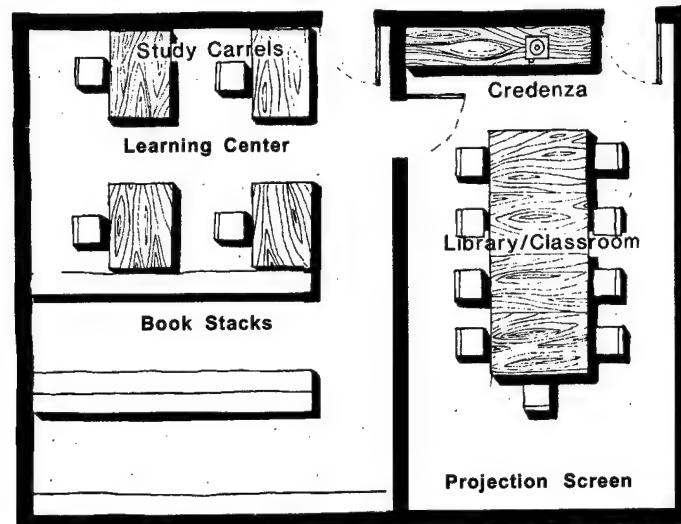


Figure 3-23. Learning center and library/classroom plan.

d. Training aid storage.

(1) Function. This space provides for the storage of graphic training aids, models and training materials.

(2) General design requirements. Training aid storage should be located adjacent to the library/classroom and learning center. The desired configuration for this space is rectangular in order to maximize wall space.

(3) Equipment. Metal shelving will be sized according to materials to be stored and will be outlined in the program. For instance, small projectors may require only an 18-inch deep shelf, whereas large models may require shelves that are 36 inches deep, with a clearance of 20 inches.

3-5. Assembly areas.

a. Assembly hall.

(1) Function. The assembly hall provides space for troop formations, maintenance of equipment, personnel assemblies, food service seating and large group assemblies for instructional training.

(2) General design requirements. The assembly hall should be directly adjacent to the kitchen and food storage space, as well as the unit supply, chair storage and the administrative and classroom space (Figure 3-24). Ceiling height should be 10 feet above slab. Consider utilizing the assembly hall as a shared usage space adjacent to the administration and classroom spaces (Figure 3-25).

(3) Equipment. Moveable furnishings may be stored in adjacent areas or located in the assembly hall as appropriate.

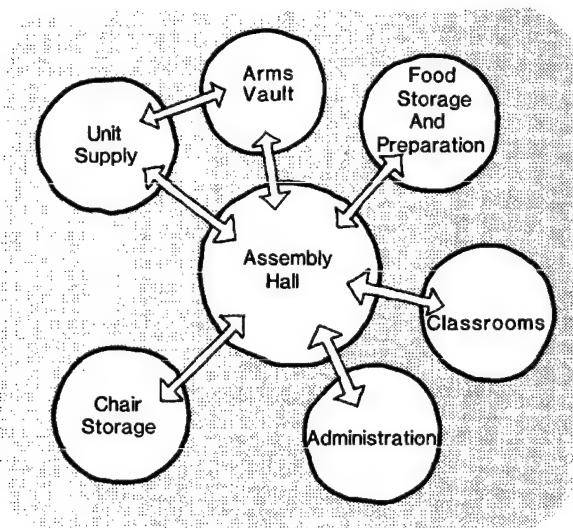


Figure 3-24. Assembly hall adjacency diagram.

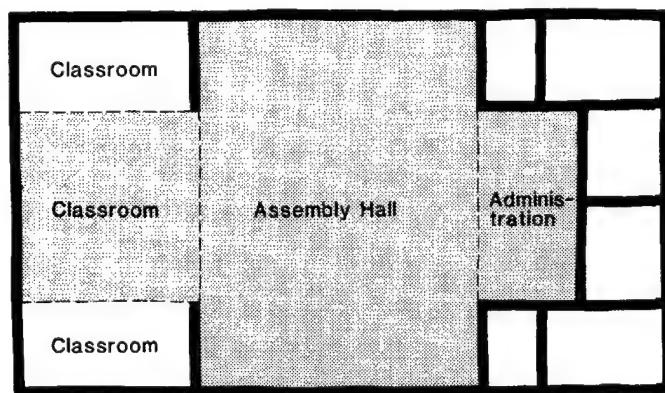


Figure 3-25. Assembly hall plan.

## b. Chair storage.

(1) Function. This space is for storage of chairs and tables.

(2) General design requirements. Chair storage space may be a part of the assembly hall or be a separate room opening onto the assembly hall (Figure 3-26). The storage space must be kept clear of mechanical equipment and electrical panels.

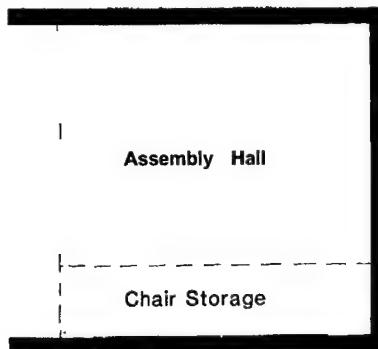


Figure 3-26. Maintenance and chair storage plan.

## c. Food Preparation

(1) Function. This space is used to clean, prepare, cook and serve the food held in the food storage area. All menu items will be served by means of a counter extending through the common wall of the assembly/dining hall. There will be a maximum of five cooks and one supervisor within this area (Figure 3-27).

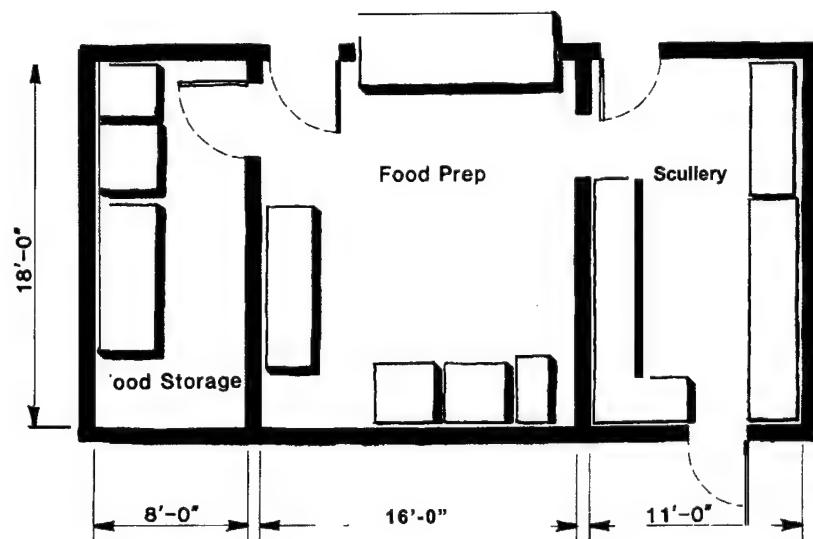


Figure 3-27. Schematic food preparation, storage and scullery plan.

(2) General design requirements. The size and shape will be determined by the location of the equipment items required for preparing the meals. Other requirements are aisle space between equipment of 3 feet, a 42-inch by 86-inch door to both the food storage area and the assembly/dining hall, an opening into the dishwashing room and an n-foot wide opening with a one hour fire rated roll-up steel door at the serving line. An exhaust hood will be provided over the cooking equipment. Untempered air hoods will be properly factory insulated to prevent condensation. The food preparation area, with adjacent food storage and scullery, must be separated, as a single enclosure from all other spaces, by one-hour, fire resistant, rated construction. In addition, the hoods, cooking surfaces and ducts must have automatic fire extinguishing systems.

(3) Equipment. The equipment listed in Table 3-1, shall be provided.

d. Food storage.

(1) Function. This space is used to store and secure all fresh, frozen and canned food items which are issued to the food preparation. Ice making machines may also be located within this area. A maximum of two food service personnel will be the only persons allowed within this space.

(2) General design requirements.

(a) The size and shape will be determined by the position of the food preparation and the equipment stored within the room. Basic criteria consist of a minimum 3-foot aisle and an 42-inch by 86-inch door which

can swing a full 180 degrees and be operable from inside when locked from the food preparation side. No door from the outside to the food storage room will be provided. The storage room should open directly into the food preparation side.

(b) Other special requirements include quarry tile (abrasive finish) floors, glazed masonry unit walls (ceramic tile or epoxy painted CMU with filler) and glazed masonry unit (quarry tile or ceramic tile) base. The ceiling should be plaster or moisture resistant gypsum board, epoxy painted.

(c) Provide adequate exhaust and intake to allow dissipation of heat build up from refrigeration equipment. The food storage area with adjacent food preparation area and scullery must be separated as a single enclosure from all other spaces by one-hour, fire resistant rated construction.

(3) Equipment. The equipment listed in Table 3-1 will be provided.

e. Scullery.

(1) Function. The scullery is used to clean all utensils, pots, dishes, trays and silverware and to store them after use. It should have at least one exterior wall and be adjacent to the food preparation. Two to four persons will be required to work in the scullery.

(2) General design requirements. The size and shape will be determined by the location of the equipment as well as the doorway to the outside and the entrance to the food preparation area. Other requirements are a minimum 3-foot aisle between equipment, a 42-inch wide exterior door and a 3-foot wide door to the assembly/dining hall. The scullery, with adjacent food preparation and food storage, must be separated as a single enclosure from all other spaces by one-hour, fire resistant rated construction. The waste water from the dishwasher and pot sinks will be routed through grease interceptors unless prohibited by local codes. The garbage disposal line should not run through the grease interceptors. The grease interceptors should be flush mounted with the floor and located in the dishwashing area. Inaccessible locations should be avoided as accessibility for cleaning is needed.

(3) Equipment. The equipment listed in Table 3-1, will be provided.

TABLE 3-1. Equipment List\*

<u>ITEM #</u>	<u>DESCRIPTION</u>
1.	Tableware dispenser
2.	Mobile tray rack
3.	Silverware dispenser
4.	Coffee maker
5.	Tray bussing rack
6.	Wall-mounted shelf
7.	Clean dishtable
8.	Soiled dishtable
9.	Dishwashing machine
10.	Garbage disposal machine
11.	Exhaust hood for dishwashing machine. Note: Consider eliminating exhaust over dishwasher by using sanitizing solution in water thus using lower temperature water.
12.	Pump unit for silverware pre-wash
13.	Pre-rinse spray assembly
14.	Pre-rinse spray
15.	Pots & pans sink
16.	Garbage disposal machine
17.	Condensate sink exhaust hood
18.	Booster heater - sanitizing sink
19.	Booster heater - pots & pans sink
20.	Cold food counter
21.	Hot food table
22.	Mixer bowls storage rack
23.	Deep fat fryer
24.	Griddle top range
25.	Burner top range
26.	Range exhaust hood
27.	Vegetable peeling machine
28.	Vegetable preparation sink
29.	Mixing machine
30.	Mixer stand
31.	Mobile food preparation sink
32.	Can opener
33.	Meat slicing machine
34.	Frozen food cabinet
35.	Ice making machine
36.	Mobile storage shelving
37.	Refrigerator

Are Needed ✓

\*See Figure 3-28 for location of equipment.

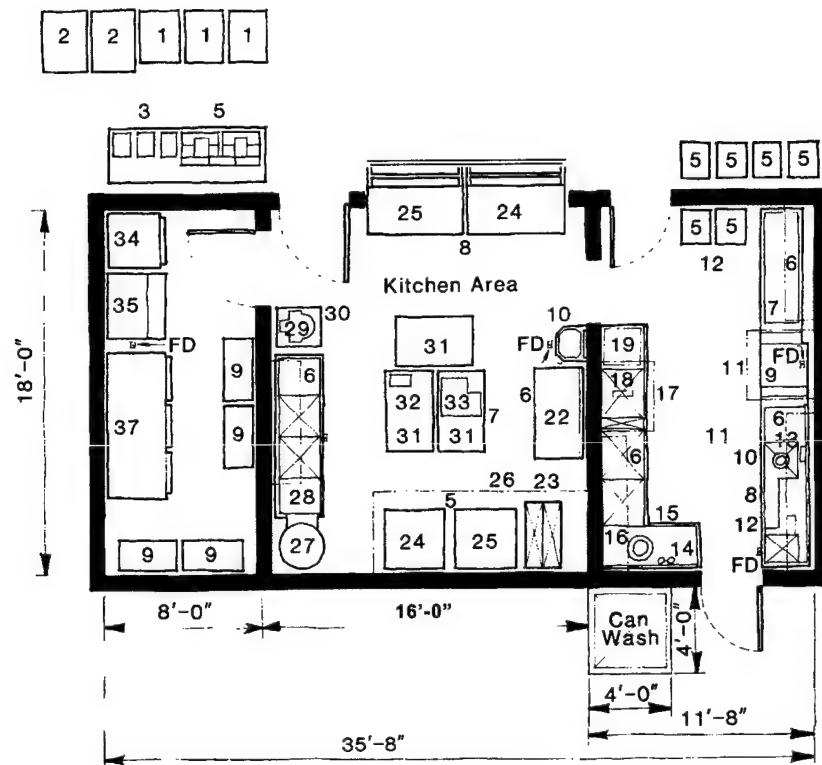


Figure 3-28. Food preparation, storage and scullery equipment plan.

### 3-6. Unit storage areas.

a. Unit Storage.

(1) Function. This space permits inventory management of organizational equipment (i.e., tents, radio, tool sets, etc.) in a separate and secure area. The issue and return of organization clothing and equipment is conducted from this space.

(2) General design requirements. The unit storage space should connect with the assembly hall. The space will be subdivided into 8-foot by 12-foot cages constructed of woven welded wire fabric. Caging should be installed from the floor to the roof deck or floor slab above. Where this is impractical, provide woven welded wire fabric ceilings. Aisles and vestibules between the secured areas should be kept to a minimum. Circulation space is not included within the total authorized net square footage. This space should be one-hour rated construction (Figures 3-29 and 3-30).

(3) Equipment.

(a) Wire caging on a 4 foot module as required. Partitions will be 10-gauge steel-wire panels, woven into 1-1/2 by 1/8 inch channels. Provide framing at pipes, ducts and other obstructions running through the partition. Shelving, 2 feet wide, should be provided on two walls.

b. Lockers.

(1) Function. Space for wall lockers is used by the reservists for storage of organizational clothing and equipment.

(2) General design requirements. Wall lockers will be placed in unit storage cages.

(3) Equipment. Metal wall lockers will be half-size, double tiered, 18 inches wide by 18 inches deep by 36 inches high.

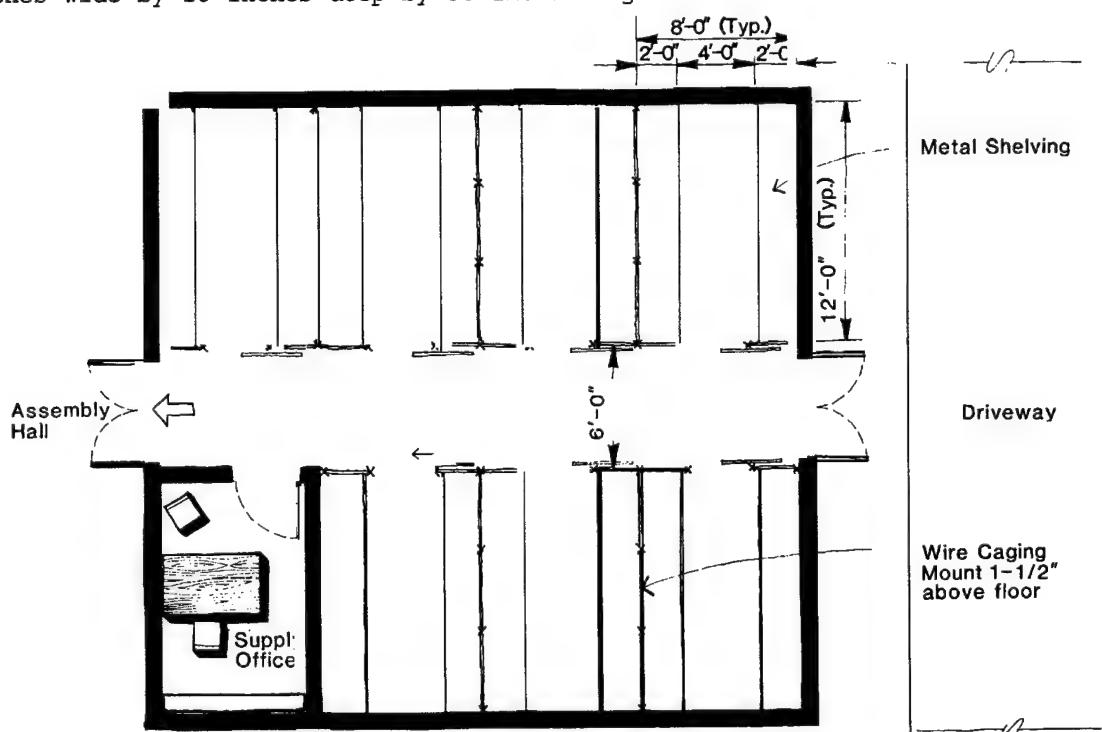


Figure 3-29. Unit storage plan.

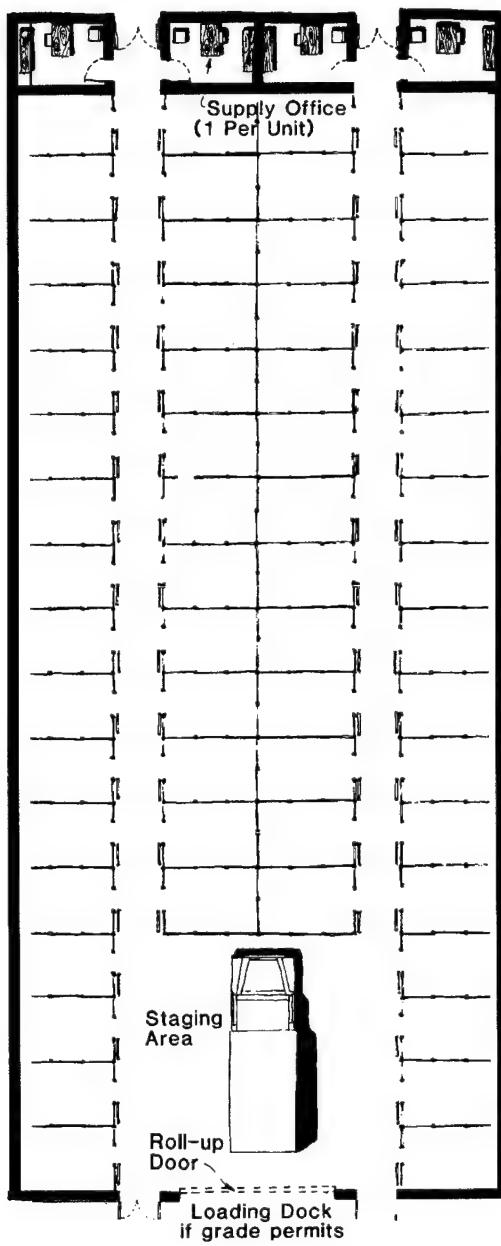


Figure 3-30. Large unit supply plan.

## 3-7. General and special support areas.

## a. Toilets and showers.

(1) Function. Space will be provided for the necessary lavatories, urinals, water closets and showers to serve both training and maintenance buildings (Figure 3-31).

(2) General design requirements. Toilet rooms for men and women will be provided on each floor of the building and be easily accessible from all areas. Handicap signs will be placed on each toilet room door on the first floor only of the main building, when applicable. All toilet room entries should be visually screened. General layout dimensions and configurations will be as illustrated. Exhaust fans will be controlled by light switches (Figure 3-32).

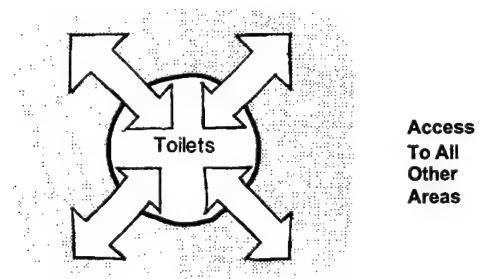


Figure 3-31. Toilet adjacency diagram.

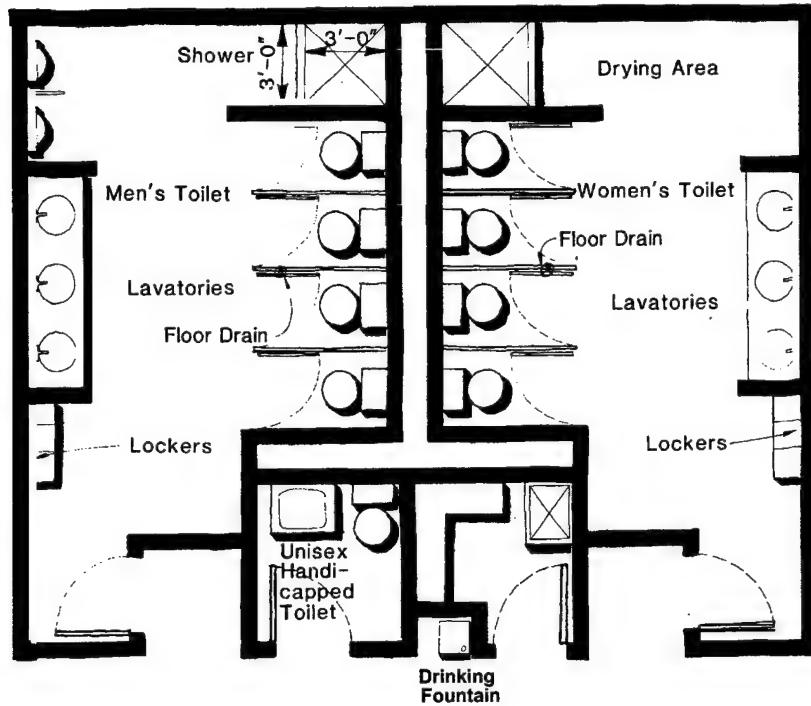


Figure 3-32. Toilet plan.

(3) Equipment. Shower stalls will be individual, pre-fabricated fiberglass units set in place. Standard metal or plastic laminate clad toilet partitions will be floor mounted with overhead steel bracing. Privacy screens should not be provided for urinals; however, a screen may be used between urinals and lavatories when located on the same wall. Grab bars will be provided in the unisex handicapped toilet room.

Fixture count will be determined by the maximum usage based on the largest number of persons drilling on a weekend. Use Tables 3-2 and 3-3 to calculate the number of authorized fixtures for men's and women's facilities. Floor drains will be provided for clean-up and maintenance in each toilet area. Water closets and urinals will be wall hung and of the syphon jet type. All plumbing fixtures will be furnished with water saving devices such as water saving flush valves, three and one half gallons per flush. Toilet fixtures for authorized medical facilities will be in addition to the total count for the center. For each water closet, provide one coat hook and one toilet paper dispenser. Provide one 16 inch by 20 inch mirror above each lavatory. Shelves should be provided in women's toilet rooms only. One bifold towel dispenser/disposal per toilet room will be provided. Provide one wall mounted liquid

soap dispenser for each lavatory. Toilet seats will be provided without covers. Provide 18 inch by 18 inch by 36 inch lockers in restrooms for full time employees. Provide robe hooks and soap dish at shower.

(a) Women's latrine facilities. For training buildings, calculate 30 percent of the largest drill weekend to be assumed for peak female occupancy, or use assigned female strength if that is the larger figure. Use Table 3-2 to select the correct number of fixtures and the total space allowance.

For AMSA, the 1 to 15 occupancy line below should be used for all women's toilets. For OMS shops, provide a unisex toilet with one water closet, one urinal and one lavatory.

TABLE 3-2. Women's Latrine

PEAK OCCUPANCY	WATER			TOTAL	
	CLOSETS	LAVATORIES	SHOWERS	FIXTURES	SPACE
1 to 15	1	1	1	3	150 SF
16 to 35	2	2	1	5	175 SF
36 to 55	3	3	1	7	225 SF
56 to 60	4	3	1	8	250 SF
61 to 80	4	4	1	9	275 SF
81 to 90	5	4	1	10	300 SF
91 to 110	5	5	1	11	300 SF
111 to 125	6	5	2	13	350 SF
126 to 150	6	6	2	14	375 SF
151 to 170	7	6	2	15	400 SF
171 to 190	7	7	2	16	400 SF
191 to 215	8	7	2	17	425 SF
216 to 230	8	8	2	18	450 SF

(b) Men's latrine facilities. For training buildings, calculate 90 percent of the strength of the largest drill weekend and use it as the peak male occupancy. Table 3-3 should be used to select the correct number of fixtures and the total space allowance.

For AMSA, 100 percent of the authorized maintenance personnel should be used. For OMS shops, provide a unisex toilet with one water closet, one urinal and one lavatory.

TABLE 3-3. Men's Latrine

PEAK OCCUPANCY	WATER				TOTAL	
	CLOSETS	URINALS	LAVATORIES	SHOWERS	FIXTURES	SPACE
1 to 35	2	1	2	1	6	200 SF
36 to 55	2	1	3	1	7	225 SF
56 to 60	3	1	3	1	8	250 SF
61 to 80	3	1	4	1	9	250 SF
81 to 90	3	2	4	1	10	300 SF
91 to 125	4	2	5	2	13	325 SF
126 to 150	4	2	6	2	14	350 SF
151 to 170	5	2	6	2	15	375 SF
171 to 190	5	2	7	2	16	400 SF
191 to 215	6	2	7	2	17	400 SF
216 to 230	6	2	8	2	19	450 SF
231 to 270	6	3	8	3	20	475 SF
271 to 305	7	3	9	3	22	500 SF
306 to 310	7	3	10	3	23	500 SF
311 to 350	8	3	10	4	25	575 SF
351 to 390	8	3	11	4	26	600 SF
391 to 395	9	4	11	4	28	625 SF
396 to 430	9	4	12	4	29	625 SF
431 to 440	10	4	12	5	31	675 SF
441 to 470	10	4	13	5	32	700 SF
471 to 485	10	5	13	5	33	700 SF
486 to 510	10	5	14	5	34	725 SF
511 to 530	11	5	14	5	35	750 SF
531 to 550	11	5	15	5	37	800 SF
551 to 575	12	5	15	6	38	800 SF
576 to 590	12	5	16	6	39	825 SF
591 to 620	12	6	16	7	40	850 SF
621 to 630	12	6	17	7	42	875 SF
631 to 665	13	6	17	7	43	900 SF
666 to 670	13	6	18	7	44	925 SF
671 to 710	14	6	18	7	45	950 SF

## b. Janitor's closet/maintenance storage.

(1) Function. Space shall be provided for the cleaning and storage of mops and related maintenance equipment.

(2) General design requirements. The janitor's closet shall be located adjacent to wet areas such as the toilets but with a separate access. One janitor's closet per floor shall be provided with the total area being deducted from the maintenance/chair storage allowance.

(3) Equipment. One floor mounted mop sink, ten linear feet of shelving and mop racks shall be provided (Figure 3-33).

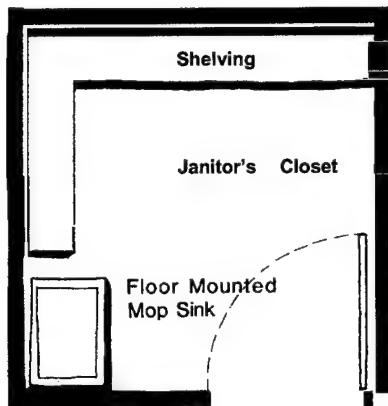


Figure 3-33. Janitor's closet plan.

## c. Mechanical equipment.

(1) Function. Space shall be provided for the location of HVAC equipment, telephone panel and power panel serving the entire training center.

(2) General design requirements. The mechanical equipment room shall be located centrally, contributing to efficient distribution (Figure 3-34). Access to an exterior door landing by both personnel and vehicles is necessary. An interior door may be authorized for special conditions such as cold climates. The space authorization may be exceeded, if justified, to provide space for maintenance of the HVAC equipment. If multiple mechanical systems are used, then multiple mechanical rooms may be required. Provide separate electrical room and telephone room as required.

(3) Equipment. A plywood backboard shall be provided for the telephone panel only. An open bank terminal is acceptable. A roof access hatch and steel wall ladder shall be provided for access to the roof. No shelving or racks shall be provided (Figure 3-35).

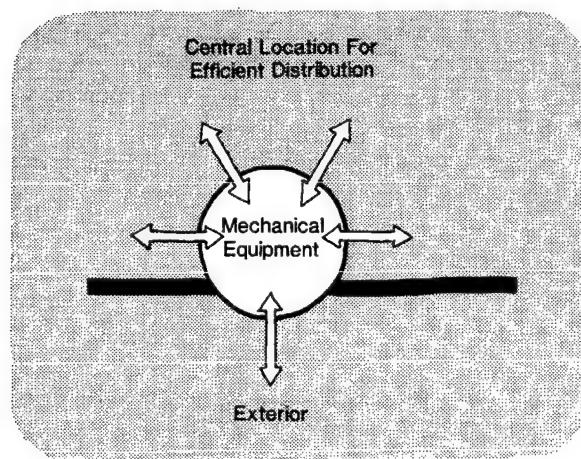


Figure 3-34. Mechanical equipment adjacency diagram.

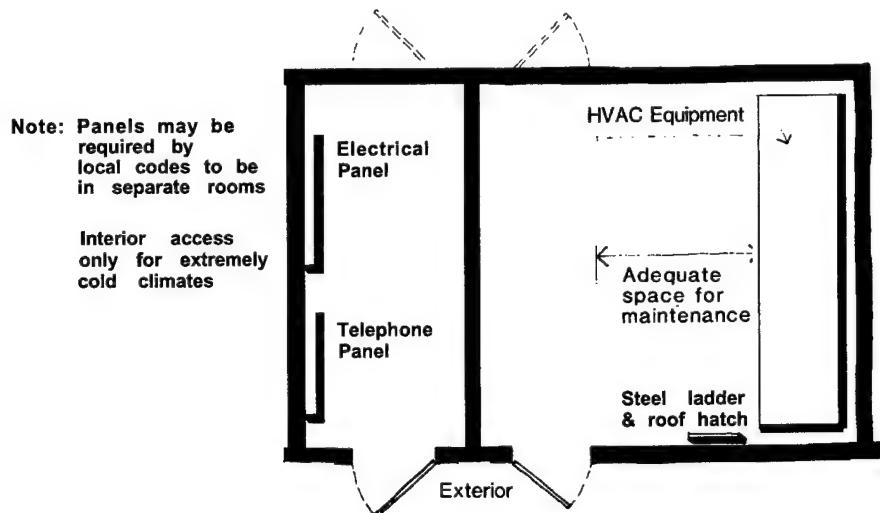


Figure 3-35. Mechanical equipment plan.

#### d. Arms vault

(1) Function. The arms vault provides secure storage of all weapons assigned to units at the facility. Ammunition may be stored in small amounts in some instances.

##### (2) General design requirements.

(a) The arms vault should be located adjacent to the firing range and assembly hall (Figure 3-36). The design should avoid locating this space on an exterior wall. Ample room outside of the vault door to accommodate the distribution of weapons should be provided. Construction of the vault will be

concrete. Walls must be 8 inches thick minimum, reinforced with # 4 reinforcing bars at 9 inches on center each way, each face, face staggered, to provide a projected 4-1/2 inch grid. The arms vault must not be penetrated by extraneous conduit, ducts, plumbing, etc. as this can create problems with the motion detection system. Ceilings must be 8 inches thick, with a minimum reinforcement of # 4 reinforcing bars, forming a grid such that no opening exceeds 96 square inches. Structural floors will be equivalent to ceiling requirements. Slabs on grade will be 6 inches thick with 6-inch by 6-inch #10/10 welded wire fabric.

(b) A Class V vault door capable of swinging open 180 degrees, with a heavy duty doorstop, will be provided. Day gates and clutch doors on arms vault are not normally provided. Provide anchor rings and rough-in for an intrusion detection system (IDS). Although the system and installation will not be included in the construction contracts, coordination with the supporting installation will be required. An alarm control box shall be placed outside the caged areas, but inside the vault. Refer to AR 190-11 for security criteria. Electrical power is to be provided through a non-fused 30 amp disconnect switch, located in the arms vault, to a lockable 30 amp disconnect switch fused for 20 amps, connected ahead of the main in the mechanical equipment room. A 3/4-inch rigid conduit should be provided from the telephone terminal board to a junction box located in the arms vault and a 3/4-inch rigid conduit from the arms vault junction box to a recessed junction box mounted on the building exterior. Provide a 110 volt outlet and a 2 inch diameter floor drain for the dehumidifier. These should be located adjacent to each other and outside of the caged areas. Battery back-up, fluorescent fixtures for emergency egress should be provided in the corridor over the vault door and be connected directly to the panel board. Coordinate lighting and caging layout to allow caging walls to extend to ceiling. In laying out arms vaults, use a 5 foot module for width to allow a 3-foot aisle between 10-1/4 inch wide rifle racks. Use a 3-foot module for length to allow for 36 inch rifle racks (Figures 3-37 and 3-38).

(3) Equipment. Gun racks and containers are government supplied and installed. A fire extinguisher should be located adjacent to the motion detection control box, both of which should be outside caged areas. Wire caging on a 3-foot and 5-foot module is to be provided by the contractor in vaults serving more than one military unit if requested. A dehumidifier outside the caged area should be provided.

(4) References. AR 190-11. Class V containers (safes) are approved for use instead of small arms storage racks and arms rooms where small quantities of weapons, central firing components and related ammunition are stored. Specific cabinets authorized for use are listed in AR 190-11.

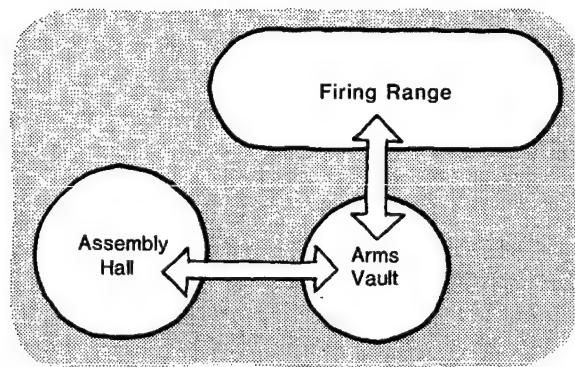


Figure 3-36. Arms vault adjacency diagram.

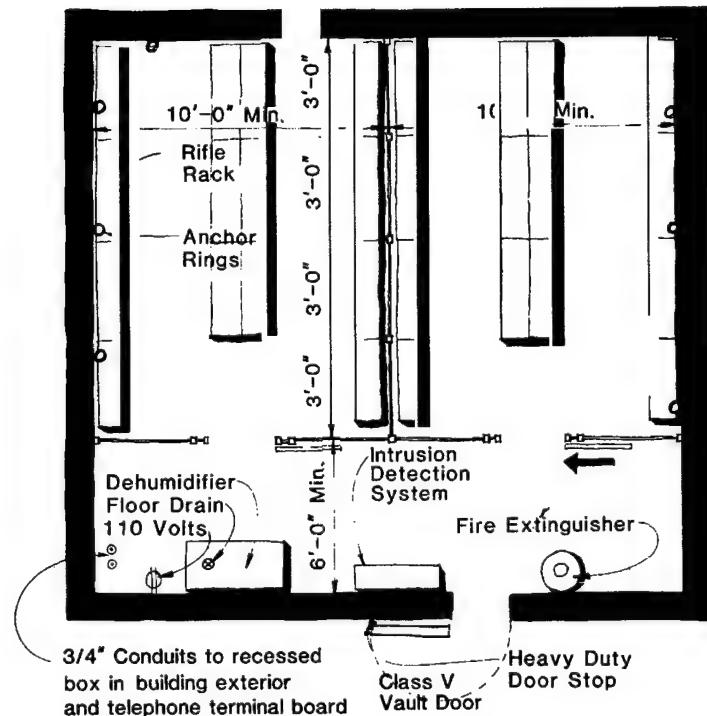


Figure 3-37. Arms vault plan.

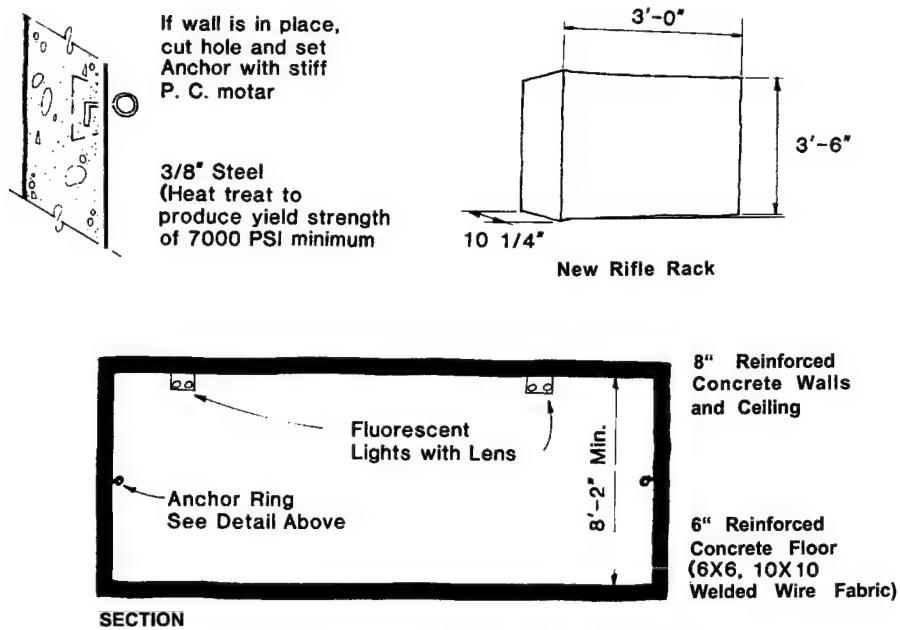


Figure 3-38. Arms vault details.

## e. Rifle range.

(1) Function. The 600-inch firing range is used for qualification firing.

(2) General design requirements. It is preferable to locate the range away from the administrative areas. Access through the assembly hall is acceptable and will be adjacent to the arms vault (Figure 3-39). The rifle range will be designed in accordance with definitive designs for a 600 inch range and field design number FD28-13-03 and the CE-R series specification (Figure 3-40). The use of standard field design FD28-13-03 is strongly recommended because of the difficulty of meeting environmental requirements without a proven design. This design is also used for renovation of older ranges. Acoustical material should be provided on the side walls behind the firing line and extend down-range to a point 24 feet from the back wall. Acoustical material should also be provided on the ceiling from the firing line to a point 24 feet from the back wall. Corners and edges of the soundproofing must be protected in order to reduce wear and deterioration. A hose bibb inside the range and located behind the firing line should be provided for washing the range floor. A floor drain with removable plug should be located ahead of the firing line. Consider the modulation of the intensity of infrared heaters through the full range of each heater's capacity and/or vary the quantity of heaters for installations in different weather zones.

(3) Equipment. A .22 caliber bullet trap (escalator type) and manual target retrieval mechanism for each firing line, with 50-foot target stops, should be provided. A central control panel for lights and ventilation system, should also be provided. A sign will be posted, by others, in the

range area designating the acceptable weapons classification and ammunition to be used on the range. Targets and range equipment will be stored in the unit supply area or general storage area.

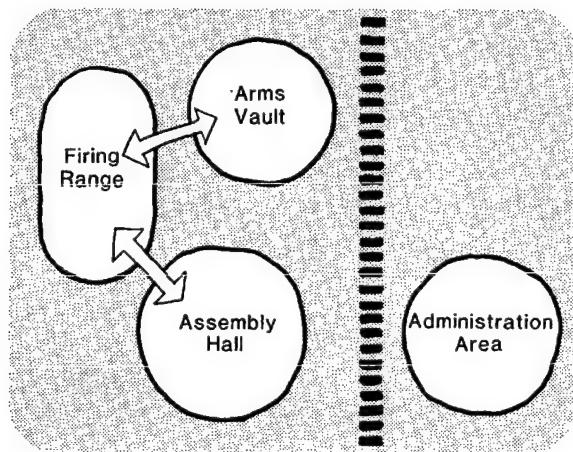


Figure 3-39. Rifle range adjacency diagram.

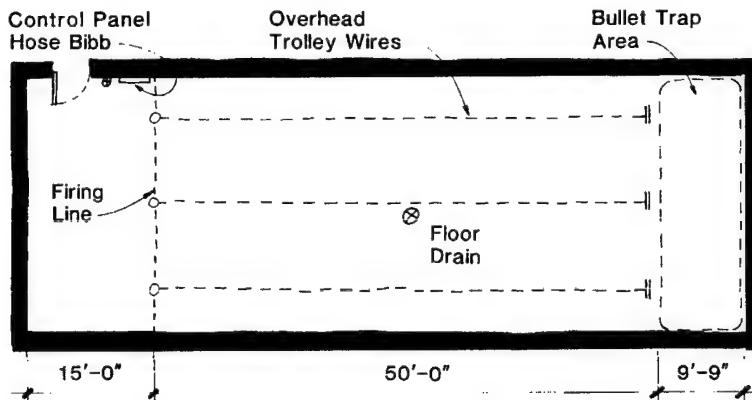


Figure 3-40. Rifle range plan

f. Medical wing.

(1) Function. When authorized, medical spaces will be provided for physical exams, treatment and professional medical training.

(2) General design requirements. The medical wing will be located within new buildings or expansion projects with a separate entry provided (Figure 3-41). It is essential that the medical wing be isolated from the rest of the building. The medical wing layout and capabilities may vary to suit the users' training requirements. The types of spaces that may be required are: waiting rooms, dressing rooms, medical exam rooms, dental exam rooms, supply

rooms, lavatories with male and female specimen toilet areas, laboratory, physical exam areas for blood pressure, E.K.G., audio meter, eye exam and height and weight measurement. Special purpose training areas such as operating rooms, scrub rooms, two bed wards, sterile supply rooms and pharmacy will be provided only when justified. Planning concepts should allow for privacy of patients when accessing dressing areas and toilets. Locate the medical wing with good access to a building entrance and to dedicated office space that can be assigned to the medical unit (Figure 3-42).

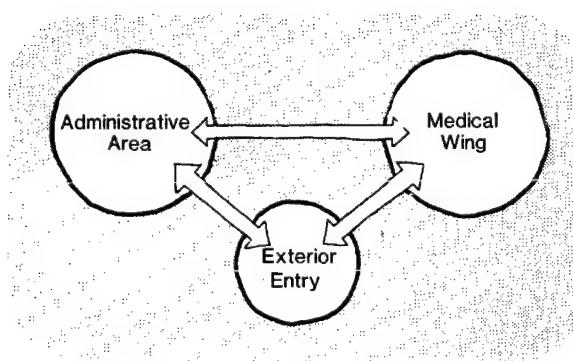


Figure 3-41. Medical wing adjacency diagram.

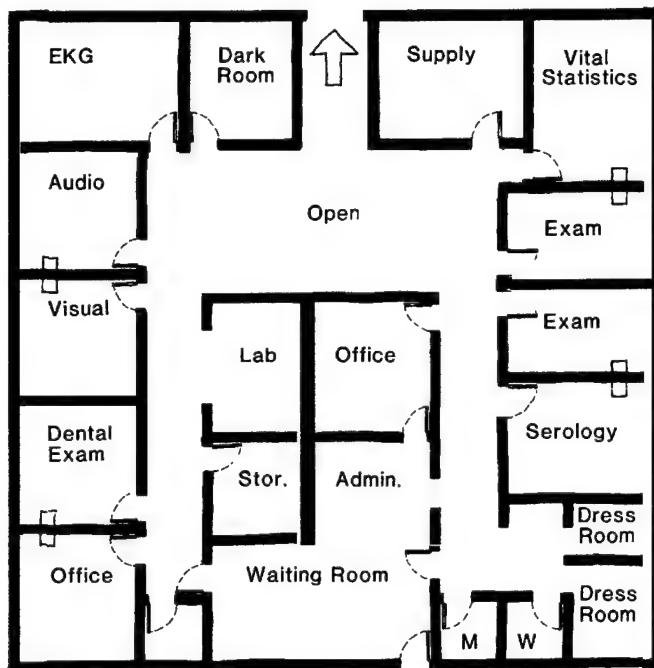


Figure 3-42. Medical wing plan.

(3) Equipment. Due to the variety of functional areas possible and variance in the medical equipment, the Using Service will provide a list of equipment and proposed locations for the special requirements when the concept design is completed. The necessary medical equipment, from standard medical equipment sets including the X-ray machines, will be provided by others. An X-ray equipment installation certificate will be required. All medical equipment will be furnished and installed by others. Built-in equipment includes the following:

- (a) Waiting room: Admissions counter 15 inches wide by 49 inches high by 12 feet long.
- (b) Dressing room: Feed-in clothes hooks - four per dressing room. A seat shall be built in on one side only.
- (c) Medical exam room: Wall hung lavatory.
- (d) Dental exam room: Wall hung lavatory.
- (e) Laboratory: Base cabinets 24 inches deep by 36 inches high with chemical resistant work counter and a two compartment stainless steel sink. This unit will be located on one wall only or as an island. The total length should not exceed 16 feet.

(f) Specimen toilet: One water closet, one lavatory, one shelf, one towel dispenser and one pass-through door to the laboratory.

(g) Dark room: Work counter 24 inches wide by 36 inches high by 96 inches long with chemical resistant worksurface. This may be located on a wall and/or an island.

(h) Audio/meter room: One booth 3 feet by 5 feet with sound treatment to 55 STC and one counter on one end of the room, 18 inches wide and 28 inches above the floor.

(i) Supply room: Twelve-inch deep wood shelving, 5 shelves high, beginning 18 inches from the floor, and epoxy painted. This shelving may be installed on three walls. Metal shelving may be used if cost justified. Note: Other built-in or installed equipment may be included on a case by case basis, provided such equipment is fully justified for the operational training needs.

g. Photography laboratories.

(1) Function. Photography laboratories are used for training in photography developing and processing.

(2) General design requirements. Typical size is 250 square feet. The room should have red darkroom lighting with a light proof, rotary dark room door and lighted sign on exterior noting when room is "in use." Provide on one wall a processing sink 5 inches deep by 32 inches wide by 5 feet long, with plumbing. Adjacent to the sink provide a 3-foot wide cabinet. On another wall, provide one 2-foot wide cabinet with drawers, one 3-foot wide adjustable easel and one 3-foot wide cabinet (Figure 3-43). All cabinets should have chemical resistant worksurfaces.

h. Soils testing laboratories.

(1) Function. The soils testing laboratory performs soils testing functions.

(2) General design requirements. Space (approximately 100 square feet) should be provided with standard 110 volt electrical outlets and a lockable door. Eight feet of chemical resistant counter space and a two-compartment, chemical resistant stainless steel sink should also be provided. Provide an operable, insulating glass window on a maximum of 15 percent of wall space (Figure 3-44).

(3) Equipment. Moveable tables will be provided by others.

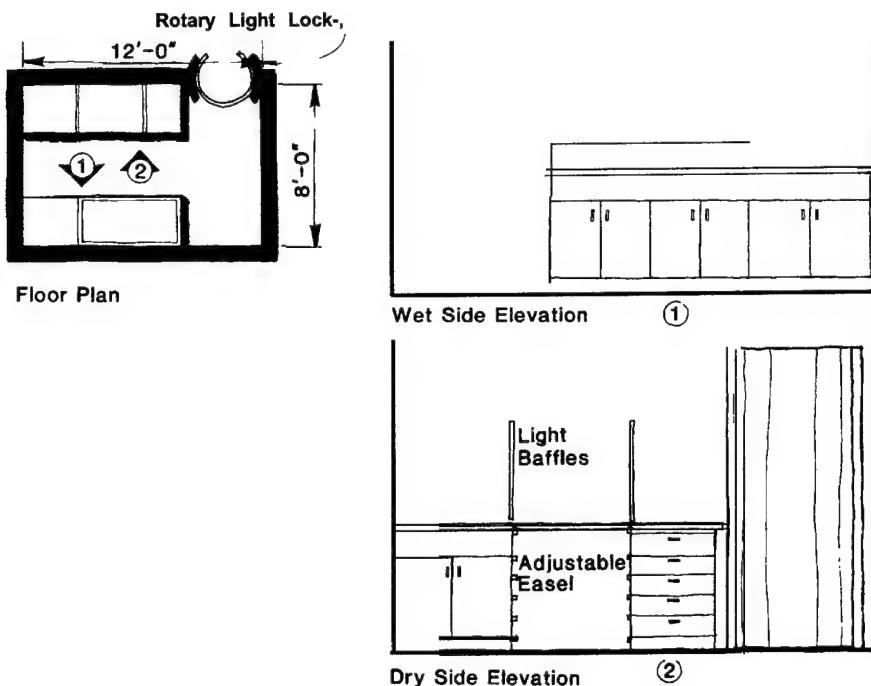


Figure 3-43. Photography lab.

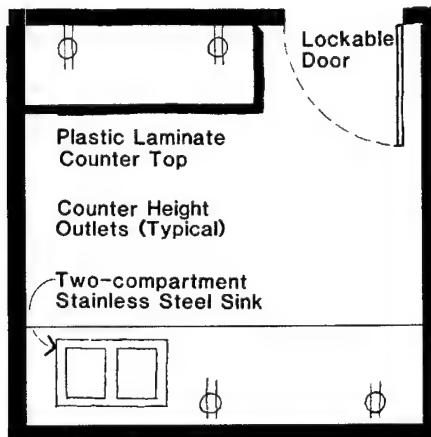


Figure 3-44. Soils testing laboratory.

i. Secure compartmented intelligence facility (SCIF).

(1) Function. This space is used for electronic intelligence training activities.

(2) General design requirements. Refer to Defense Intelligence Agency (DIA) Manual 50-3.

j. Band room.

(1) Function. The band room is a practice area for a standard 44 member band and storage space for their instruments.

(2) General design requirements. This space should be located adjacent to the assembly hall and isolated from classroom and administrative areas (Figure 3-45). Acoustical treatment to the walls and ceiling should be provided as required to attain an STC of 53. The walls should extend to the roof deck or floor above. Provide space as follows:

Area	Size (Feet)	Total Area (Square Feet)
2 Offices	10 x 15	300
3 Practice rooms	7 X 10	210
1 Storage	20 x 20	400
1 Rehearsal	16 x25	800
1 Recording	8 x 10	80
1 Library	8 x 2 0	160
1 Main rehearsal	25 x 6	900
Total		2850

(3) Provide a two tier riser stage 20 feet by 36 feet. The first tier should have an 8-inch riser with a 5-foot tread. The second tier should have an 8-inch riser with a 15-foot tread. Provide storage shelving for sheet music, catalogs and phonograph records (Figure 3-46).

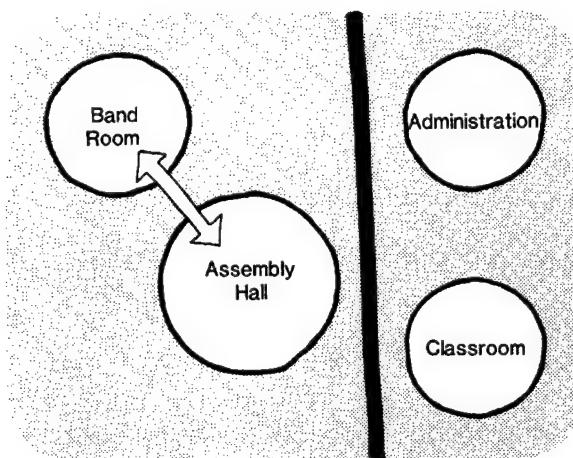


Figure 3-45. Band room adjacency diagram.



Figure 3-46. Band room plan.

### Section III. MAINTENANCE FACILITIES.

#### 3-8. Organizational maintenance shop (OMS).

##### a. Shop office.

(1) Function. The shop office provides space for the performance of administrative functions relating to dispatch records, maintenance records and scheduling.

(2) General design requirements. The location of the shop office should provide maximum visibility of work bays (Figure 3-47). Access should be provided from the shop office into the work bay area as well as from the exterior of the building. Drive through work bays should be included where possible (Figure 3-48).

(3) Equipment. Moveable furnishings such as desks and filing cabinets will be provided by others.

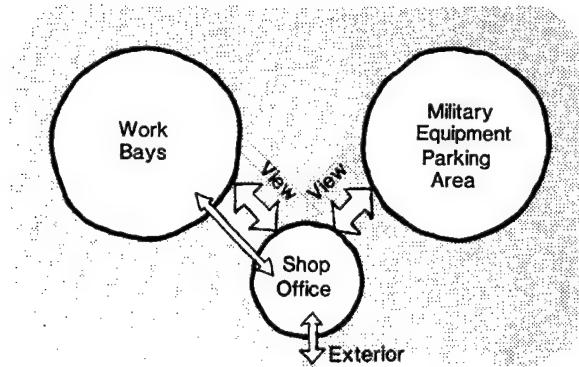


Figure 3-47. Shop office adjacency diagram (OMS).

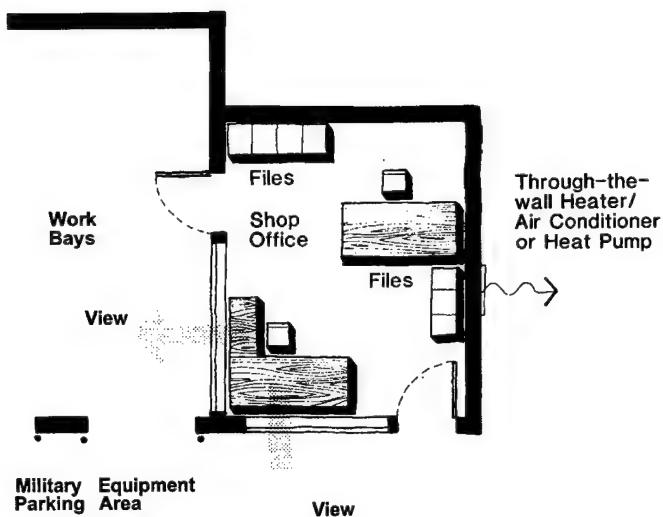


Figure 3-48. Shop office plan.

## b. Work bay.

- (1) Function. The work bay provides space for the performance of services and repairs of assigned equipment (mobile and stationary).
- (2) General design requirements.
  - (a) The work bays are the core of the OMS, with the other support

areas normally located around the perimeter to provide direct access to the work bays, especially the shop office (Figure 3-49). The work bays must also have direct access to an eyewash/deluge shower, service sink and electric water cooler. The functional layout should allow for the future addition of work bays. There are two basic types of work bay configurations, single access and drive-through double access (Figures 3-50 and 3-51). Water run-off from work bay cleaning operations should be collected in a trench drain located inside the overhead door and emptied into a grease/oil separator connected to the sanitary sewer.

(b) A 15 amp, 208 volt receptacle and plug should be provided for a welder when authorized. Welding equipment must be provided with a hood. A good location is near the overhead door so the welder can be used on the concrete apron. In instances where it becomes more economical to construct the OMS with one roofline, the area above the ancillary shop space may not be used for additional storage and mechanical equipment space. Maintenance drive-through work bays should be 20 feet wide by 36 feet long. Single access bays should have the same width but should be 40 feet long. End bays must be 23 feet wide for circulation and work bench space. Concrete aprons serve as outdoor workbays and should be the same dimensions as the adjacent indoor bays. End work bays are authorized an additional 3 feet of width for circulation. A 40- foot deep exterior concrete service apron should be provided for each work bay for use of portable hydraulic hoists. The vehicle exhaust drops should be located in each work bay 24 feet from the work bay entrance. The drops must be of sufficient flexibility and length to adequately serve vehicles with rear or right-side exhaust. The light fixture layout should be designed to provide adequate illumination even when the overhead doors are open. A minimum vertical clearance of 14 feet must be maintained in work bays (Figures 3-52 and 3-53). In addition to overhead doors for vehicle access, the work bays should also include personnel doors. Steel pipe bumper posts 5 feet 6 inches high should be provided at overhead door locations. Check swing of vehicular exhaust system for interference with lights, mechanical equipment, hoists, doors, etc.

(3) Equipment. An air sweep exhaust for the entire work area should be located 1 foot 6 inches above the floor. Overhead unit heaters and light fixtures in the work bays should be located to avoid interfering with the operation of the overhead doors or restricting the clearance above the vehicles being serviced. Vehicle exhaust system will be contractor furnished and installed. A portable hydraulic lift will be unit furnished and installed. Air compressor will be contractor furnished and installed and normally located in the mechanical room. Service sink and electric water cooler will be contractor furnished and installed. Fire extinguisher brackets will be contractor furnished. One cold water hose bib, one compressed air outlet with quick disconnect and one 110 volt duplex should be located between adjacent bays, at each door and in the center. Thus, for a 6 bay drive-through shop, provide 6 clusters. Protect hose bib and compressed air outlets with steel pipe posts. Piping for the compressed air will be provided by the contractor, and in an OMS, space in the electrical panel will be provided for power to the compressor. A compressed air outlet to the exterior apron area should be provided. Information related to the size of the compressor must be verified by the Design Agency at the end of the concept design phase.

Provide a 7-1/2-ton monorail crane for AMSA and DS/GS shops. The monorail shall run across the width of the bays.

- (a) Locate lighting between bays to eliminate shadows.
- (b) Use skylighting.
- (c) Provide windows in overhead doors.
- (d) Use electrical overhead door operators.

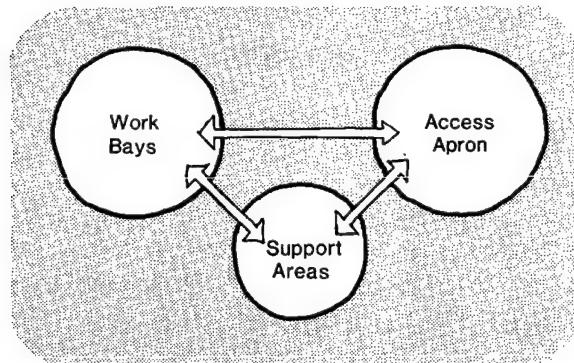


Figure 3-49. Work bay adjacency diagram (OMS).

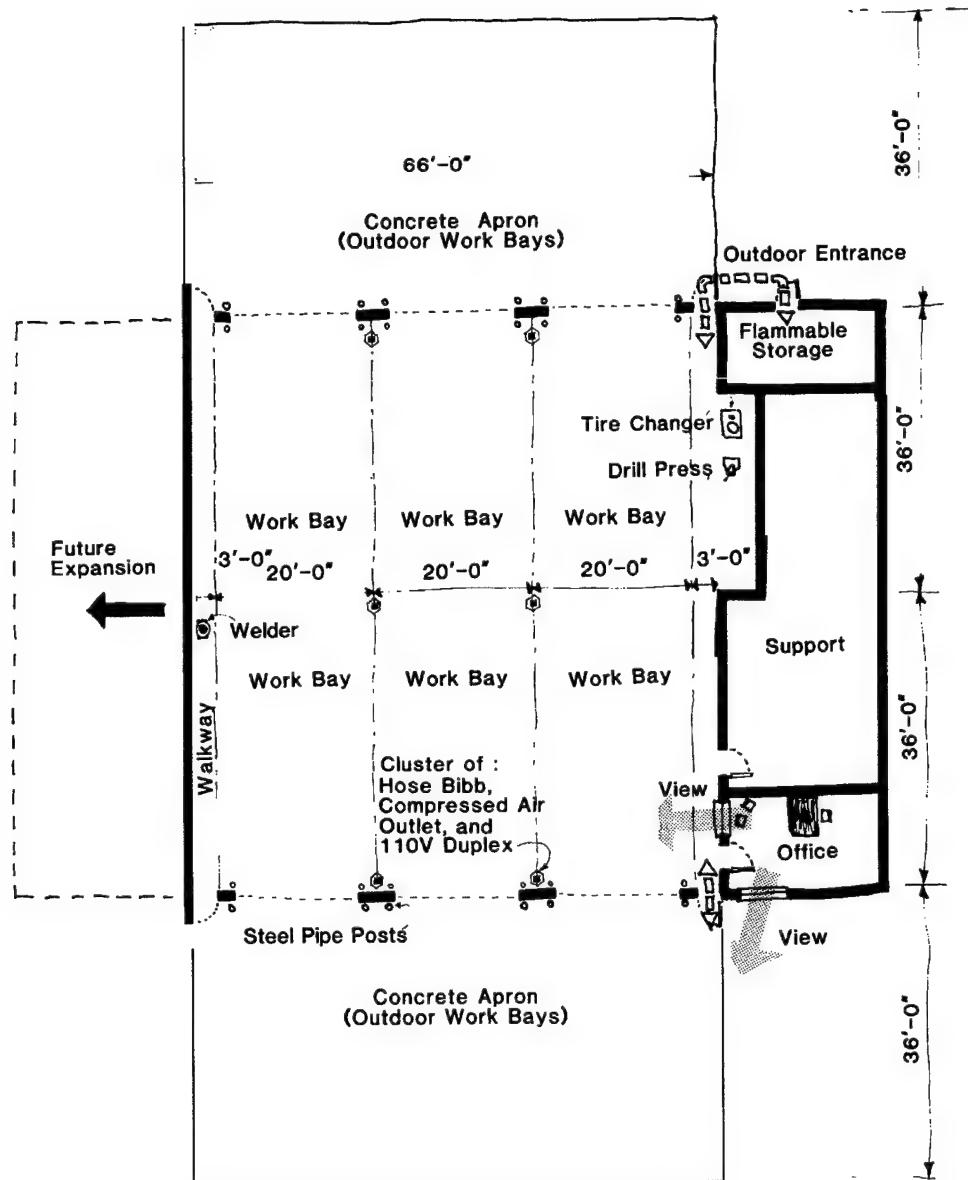


Figure 3-50. Drive-through double access work bay plan (OMS).

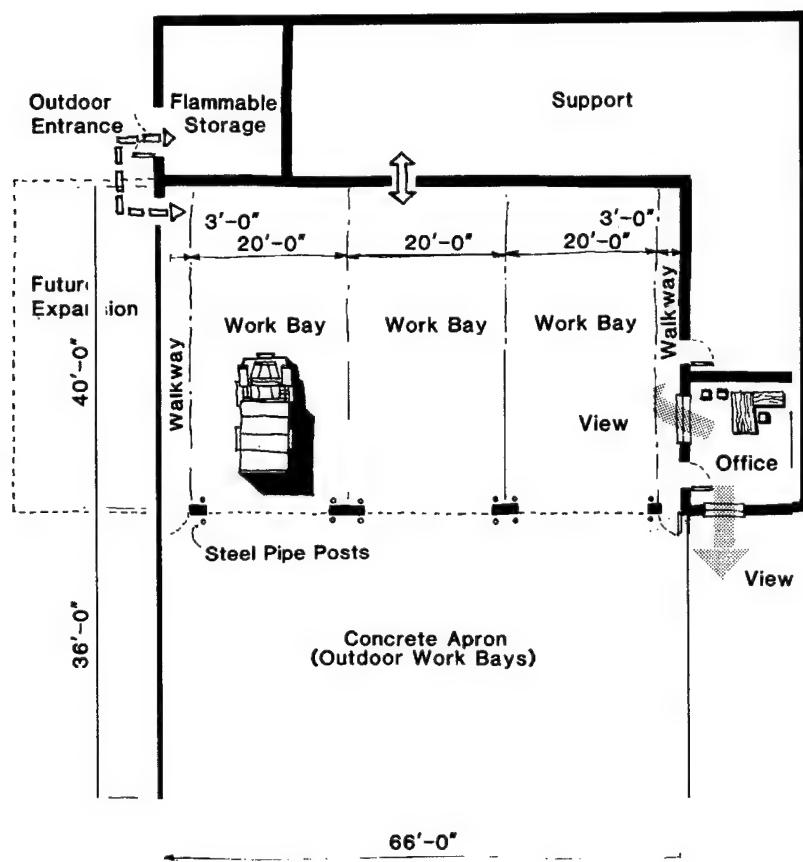


Figure 3-51. Single access work bay plan (OMS).

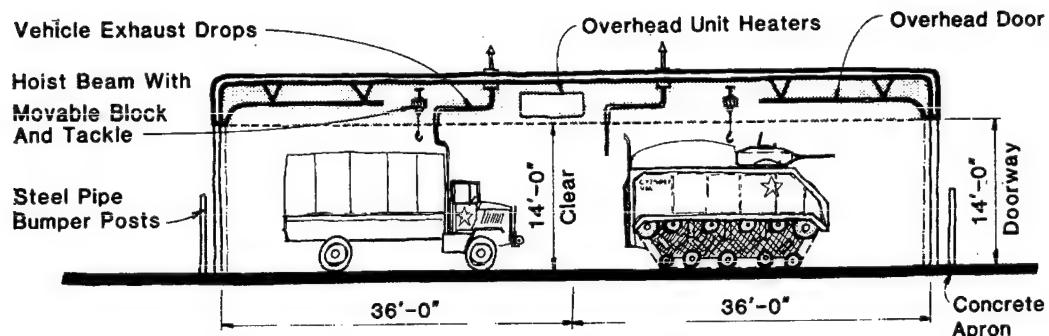


Figure 3-52. Work bay section (OMS).

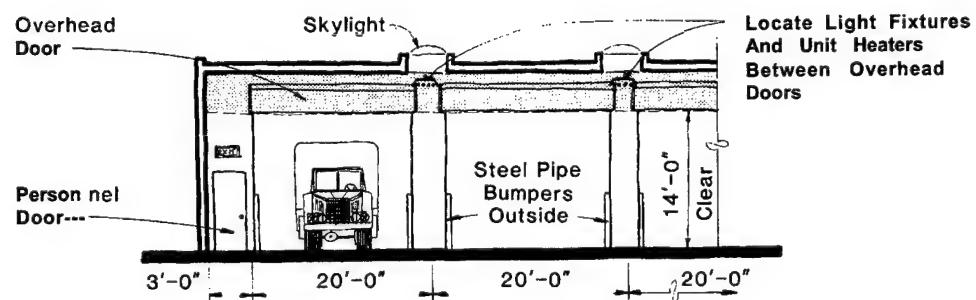


Figure 3-53. Work bay section (OMS).

## c. Tools and parts.

(1) Function. This space provides storage and issue for spare parts and storage of tools, especially mechanics' tool sets and organizational maintenance sets.

(2) General design requirements. The tool and parts space should be adjacent to the storage room and directly accessible to the work bays (Figure 3-54). The space is divided by caging planned on a 5-foot 6-inch module. The door should be operable from the inside when locked from the outside. The Design Agency will verify whether or not a dutch door is required. Divide allocated space into 8-foot by 12-foot cages. Shelving will be contractor furnished and installed (Figure 3-55).

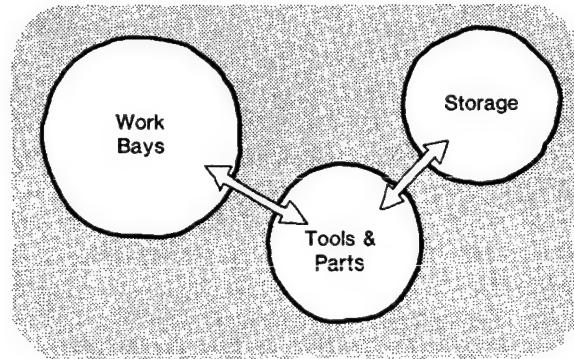


Figure 3-54. Tools and parts adjacency diagram (OMS).

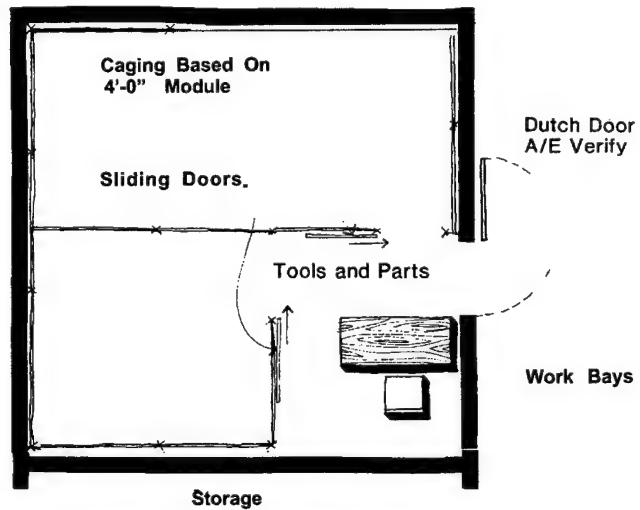


Figure 3-55. Tools and parts plan (OMS).

## d. Storage.

(1) Function. Storage space should be provided for ancillary equipment issued with vehicles, including operators' vehicle maintenance tools, canvas, canvas bows, seats, sideboards, etc.

(2) General design requirements. The location of storage areas should be adjacent to and directly accessible to the work bays and be adjacent to tool and parts storage. This space may be divided by caging with separate access to accommodate more than one military unit. When used, caging shall be planned on a 5 foot module. A minimum of two duplex 110 volt outlets shall be provided.

## e. Battery.

(1) Function. This space is to be provided for servicing, charging, and storage of lead-acid batteries.

(2) General design requirements. The battery space should be located adjacent to the toilet area, whenever possible, in order to reduce plumbing lines (Figure 3-56). A floor drain and hose bib should be provided. The drain should be connected to the sanitary sewer with acid resistant line. An acid neutralization step, if required by local codes, should also be installed. Based on the number of batteries to be charged, provide 110 volt duplex outlets above the benches. Power to the outlets should be provided by a switch which also controls the exhaust fan. In addition, a sail switch should be provided to assure that charging cannot take place without proper ventilation. The lights may be controlled separately. Eyewash/deluge showers will be located at the battery room entrance both inside and outside. Open flame heating devices will not be used in the battery room (Figures 3-57 and 3-58).

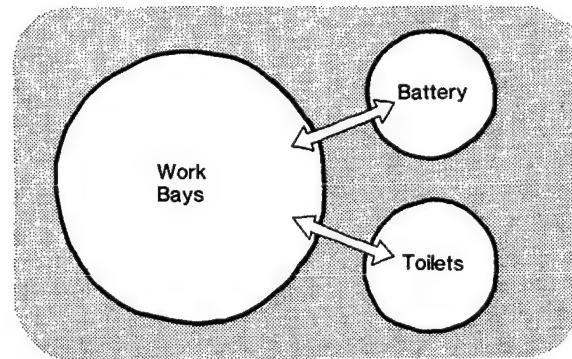


Figure 3-56. Battery adjacency diagram (OMS).

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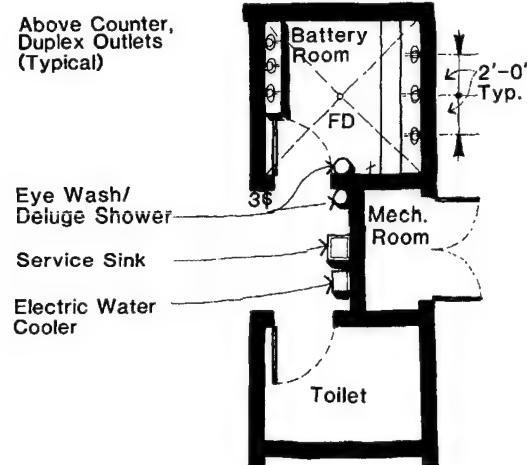


Figure 3-57. Battery plan (OMS).

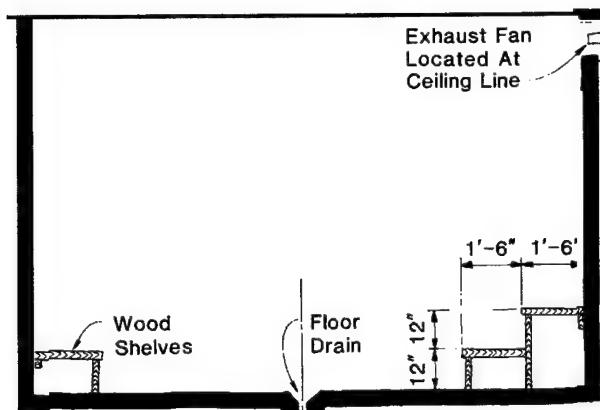


Figure 3-58. Battery section (OMS).

(3) Equipment. The length of shelving provided in an OMS varies from 20 linear feet for an 80 square foot battery space to 50 linear feet for a 200 square foot battery space. Proportions for an AMSA battery room are the same and increase to 100 linear feet for a 400 square foot AMSA battery room. The nominal width of shelving is 18 inches. The recommended material for this shelving and frame is redwood. Redwood benches will be contractor furnished and installed.

f. Toilets.

(1) Function. Restrooms will be provided for personnel working in the OMS and MEP areas.

(2) General design requirements. Toilets should be located near the battery room, service sink and eyewash/deluge shower to reduce plumbing runs (Figure 3-59). Wall hung water closets and siphon jet urinals should be provided. Lighting fixtures should be integrated into the ceiling in lieu of fixtures over the mirrors. One water closet with a partition, one urinal and one lavatory should be provided in a unisex toilet room. A screen should be provided between the urinal and the lavatory. The door to this space should be provided with a privacy lock (Figure 3-60).

(3) Equipment. Provide standard metal clad or plastic laminate toilet partitions. One coat hook and one toilet paper dispenser for each water closet, one 16-inch by 20-inch mirror above each lavatory and one hi-fold towel dispenser per toilet space should be provided.

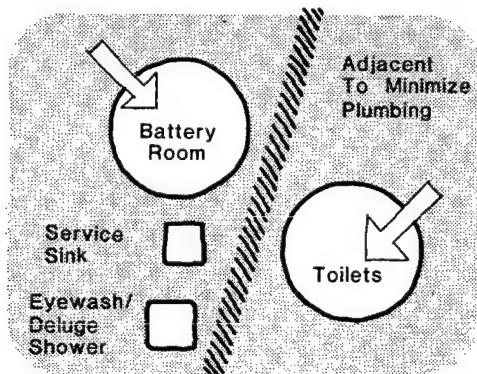


Figure 3-59. Toilet adjacency diagram (OMS).

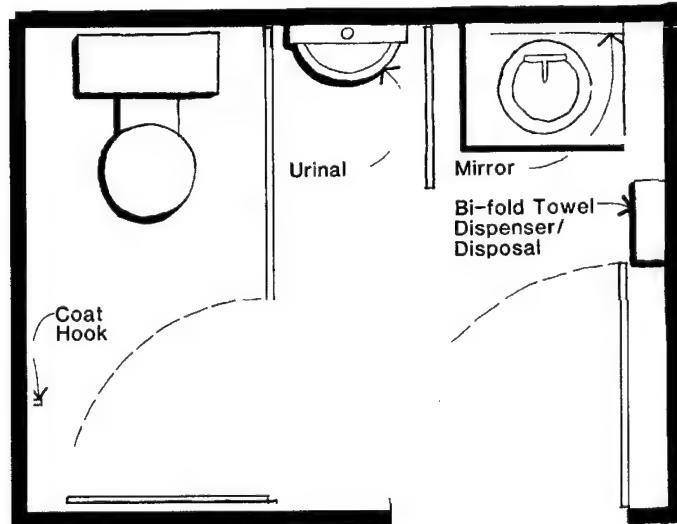


Figure 3-60. Toilet plan (OMS).

## g. Flammable storage.

(1) Functions. This space is provided for storage of petroleum based lubricants and paints. This space is normally constructed as part of the OMS when authorized.

(2) General design requirements. This space should be provided with exterior access only. Light switches should be mounted external to the flammable storage and be weatherproof with a power-on indicator light. Provide continuous gravity ventilation.

## h. Mechanical equipment.

(1) Function. Space should be provided for the location of electrical panels, hot water heaters, heating equipment and air compressors.

(2) General design requirements. The mechanical equipment space should be centrally located for efficient distribution. Access may be from the interior or, preferably, from the exterior of the building. The door must be sized to accommodate the servicing and removal of the equipment. The door should be operable from the inside when locked from the outside. Space exclusively for mechanical equipment may not always be required. In that case, equipment such as water heaters, compressors and electrical panels should be placed out of the way without restricting accessibility to the equipment.

(3) Equipment. An air compressor, hot water heater, all electrical panels and other mechanical equipment will be contractor furnished and installed.

## 3-9. Area maintenance support activity (AMSA).

## a. Small arms shop and vault.

(1) Function. The shop and vault provide space for the repair and storage of small arms such as rifles, machine guns, grenade launchers, etc.

(2) General design requirements. The shop should be located adjacent to the arms vault with access to the vault through the shop (Figures 3-61 and 3-62). A 110 volt continuous strip should be provided over the work benches. Work benches and their locations will be provided by the user. Construction of the vault is similar to the training center building vault. Refer to paragraph 3-7.a.

(3) Equipment. The lighting level in the shop may be supplemented by task lighting for detailed work and will be provided by the user.

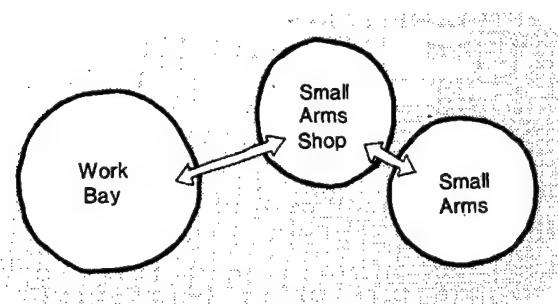


Figure 3-61. Small arms shop and vault adjacency diagram (AMSA).

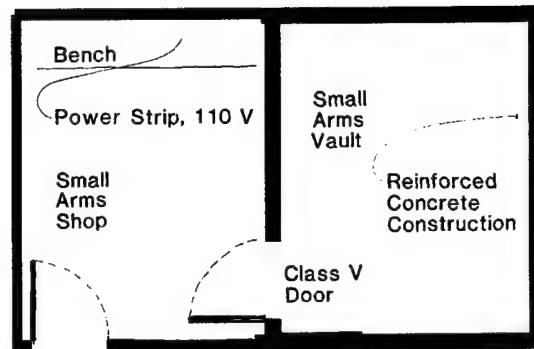


Figure 3-62. Small arms shop and vault plan.

b. Supply.

(1) Function. Space should be provided for the storage, receipt and issue of spare parts for AMSA maintenance and operations.

(2) General design requirements. The supply space is a part of the tools and parts room, but should also be separated from the tools and parts with standard 4-foot module caging. The space should be centrally located for ease of access from the bays (Figure 3-63). A minimum of two duplex 110 volt wall outlets should be provided. A full height or clutch door may be provided into the caged area. A supply office may be provided adjacent to the supply space. The design criteria are the same as those for an OMS office space (Figure 3-64).

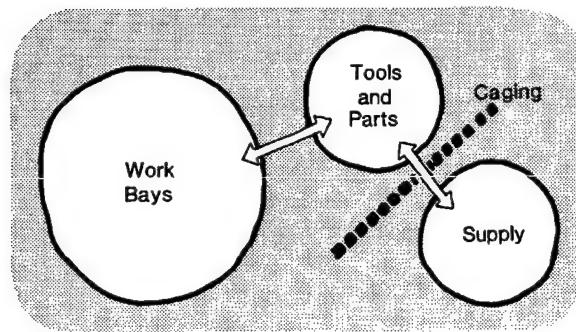


Figure 3-63. Supply adjacency diagram (AMSA).

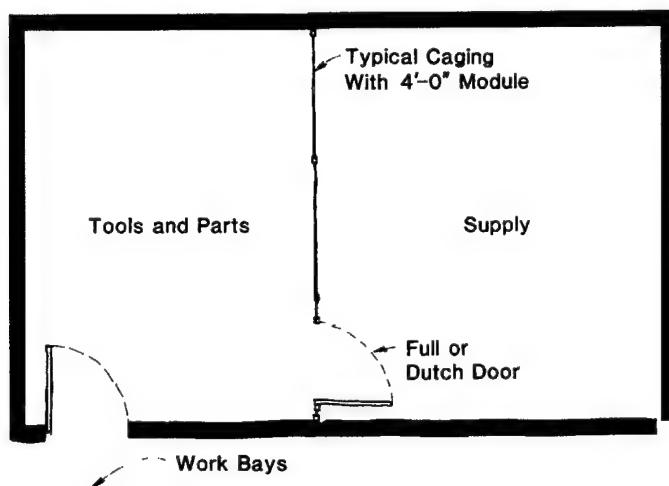


Figure 3-64. Supply plan (AMSA).

## c. Communications/electronics repair.

(1) Function. This space is provided for the repair and storage of supported units' communications equipment.

(2) General design requirements. This space should have direct access into the work bay area. Consideration should be given to insulating the room separately to reduce the energy requirement for air conditioning (Figure 3-65). Provide a 110 volt continuous wall outlet strip, 48 inches above the floor, over the work benches. The work benches will be provided by the Using Service. The lighting level may be supplemented by task lighting for fine work and will be provided by the Using Agency (Figure 3-66).

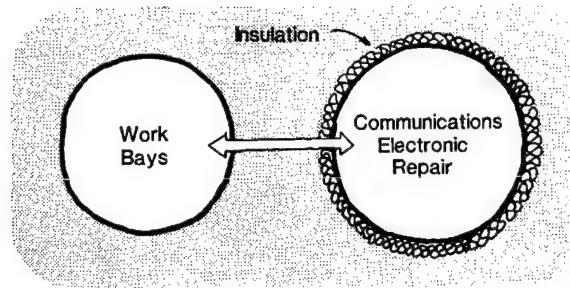


Figure 3-65. Communications/electronic repair adjacency diagram (AMSA).

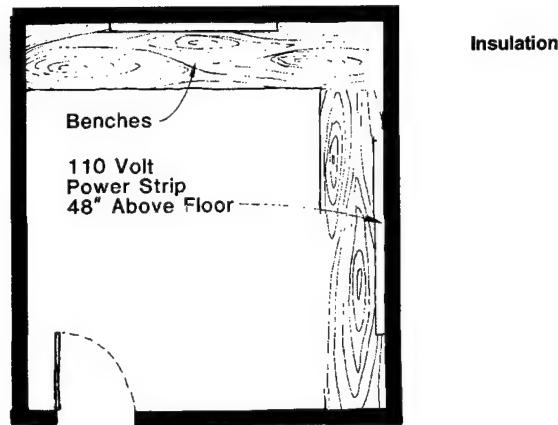


Figure 3-66. Communications/electronic repair plan (AMSA).

d. Break room.

(1) Function. A multi-purpose space for employee relaxation and meals should be provided. This space may also be used to conduct classroom training activities.

(2) General design requirements. This multi-purpose space should be located adjacent to the locker areas or combined with the lockers in one room (Figures 3-67, 3-68 and 3-69).

(3) Equipment. A wall mounted electric water fountain should be provided.

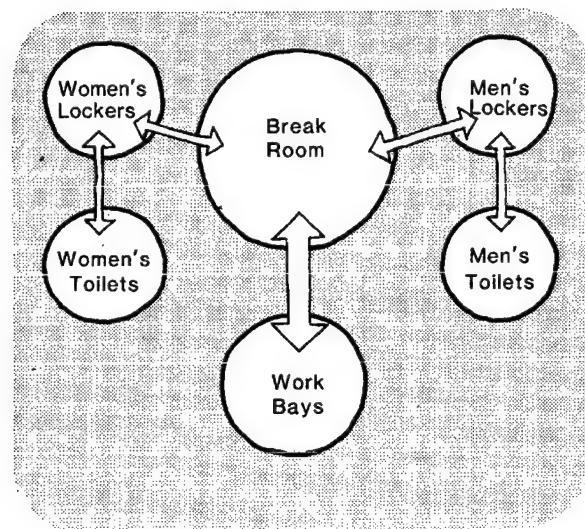


Figure 3-67. Break room adjacency diagram (AMSA).

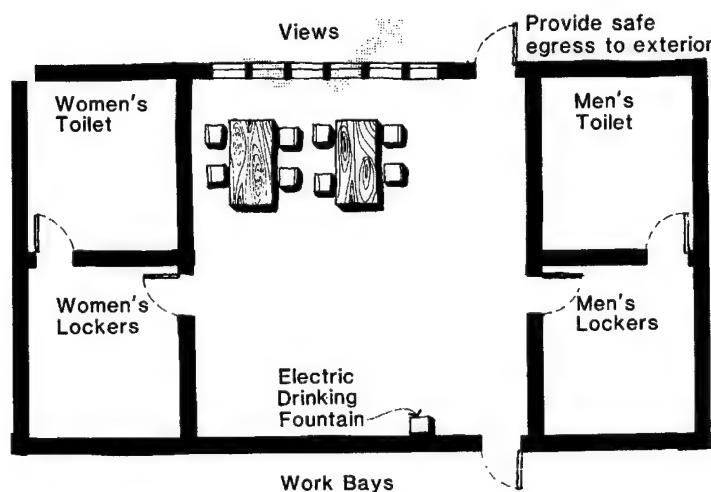


Figure 3-68. Break room plan (AMSA).

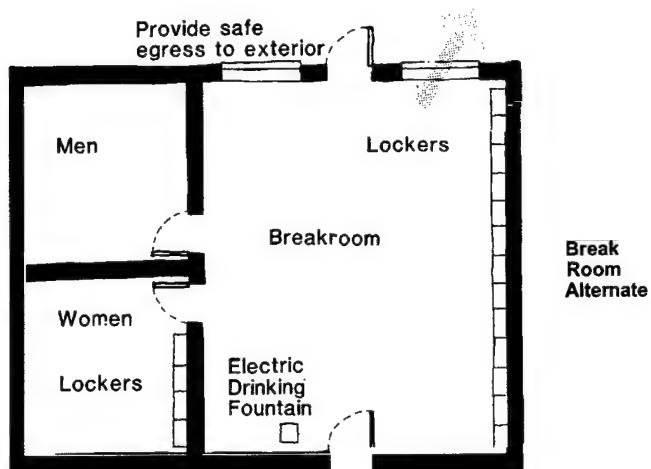


Figure 3-69. Alternative break room plan (AMSA).

e. Locker room.

(1) Function. Separate spaces for both men's and women's lockers should be provided. These lockers will be used by full time, civilian maintenance technicians to store street clothing and to change.

(2) General design requirements. The lockers should be located adjacent to the break area and their respective toilet facilities (Figure 3-70).

(3) Equipment. Provide wall hung, full-size, solid metal lockers, 15 inches wide by 18 inches deep by 72 inches high. The number of wall lockers should equal the number of AMSA personnel authorized (Figure 3-71).

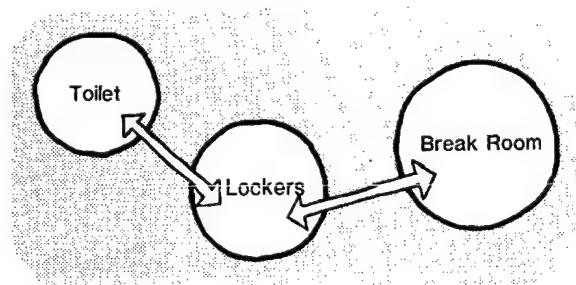


Figure 3-70. Locker room adjacency diagram (AMSA).

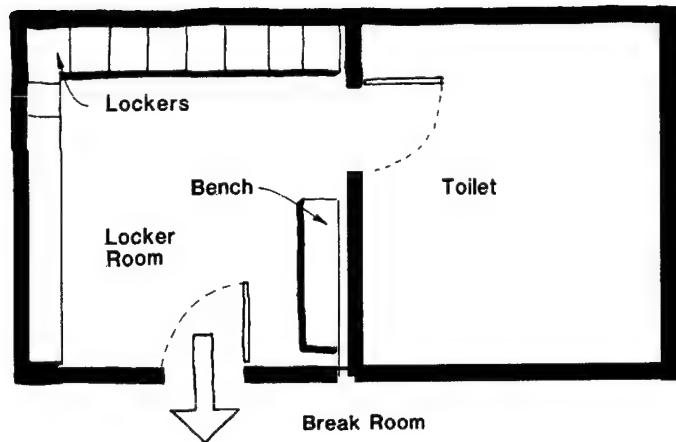


Figure 3-71. Locker room plan (AMSA).

f. Toilets.

(1) Function. Restroom facilities for employees.

(2) General design requirements. Toilet areas should be located as close as possible to service sinks, battery rooms and eye wash/deluge showers to reduce the length of plumbing lines (Figure 3-72). The area for toilet rooms should be based on the number of fixtures. The number of fixtures to be provided will be based on the number of authorized employees and on Tables 3-2 and 3-3.

(3) Equipment. The following equipment shall be provided:

- (a) wall hung water closets and syphon jet type urinals
- (b) standard metal or plastic laminate clad toilet partitions
- (c) one coat hook and one toilet paper dispenser per water closet
- (d) one 16-inch by 20-inch mirror and one light per lavatory
- (e) one hi-fold towel dispenser per toilet room

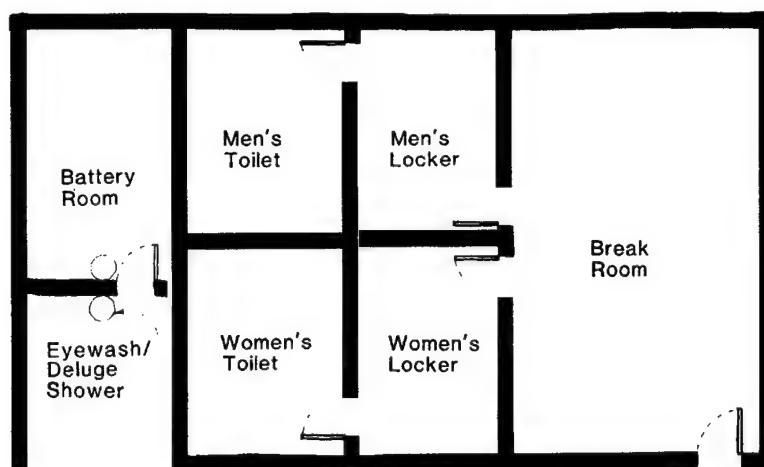


Figure 3-72. Toilets (AMSA).

3-10. AMSA diagrams. Figure 3-73 illustrates the overall functional relationships within an AMSA. Figures 3-74 and 3-75 illustrate a drive-through AMSA and a drive-through AMSA/OMS combination respectively.

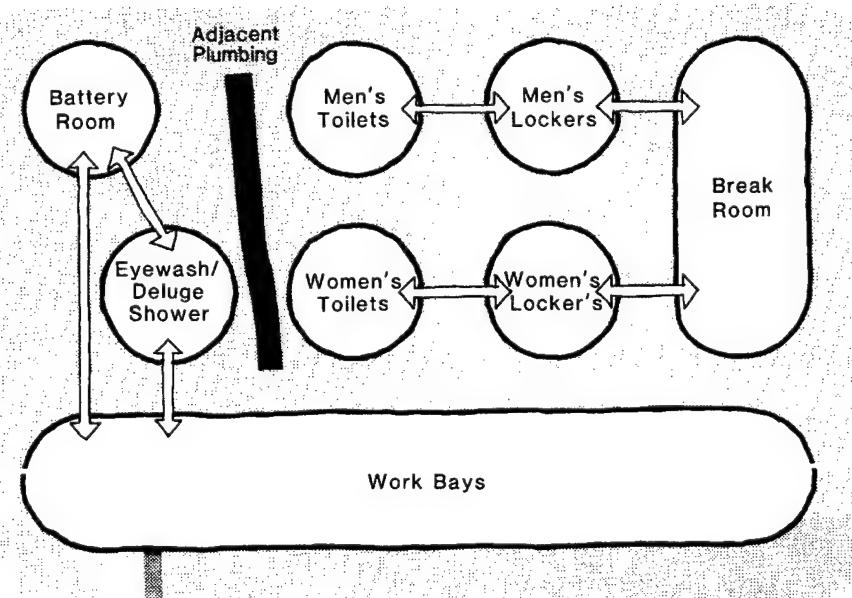


Figure 3-73. AMSA adjacency diagram.

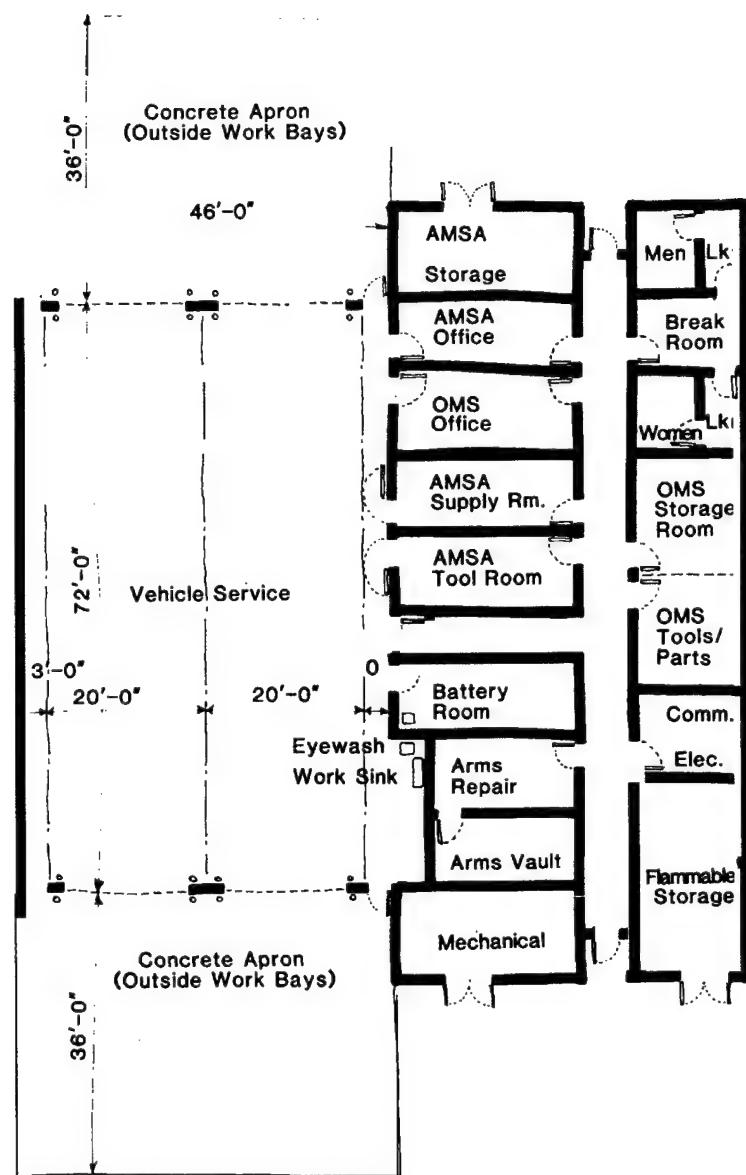


Figure 3-74. Drive-through AMSA plan.

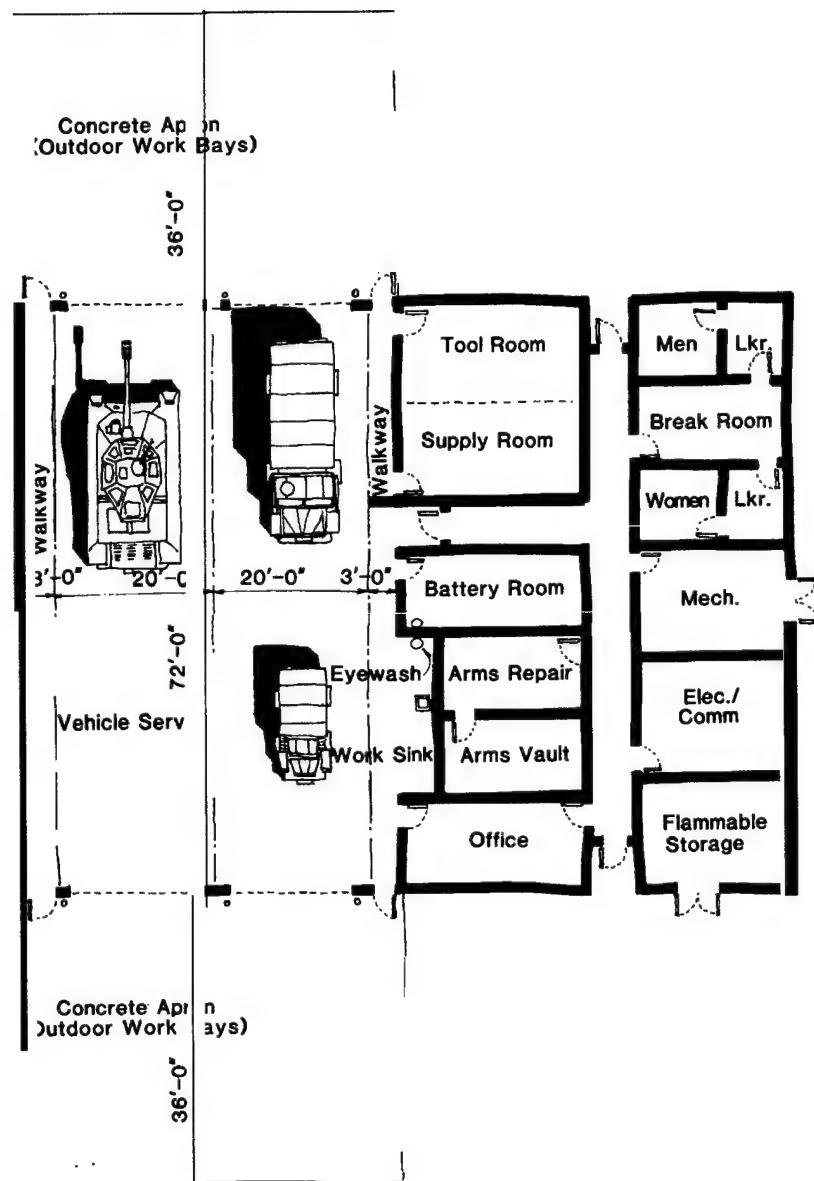


Figure 3-75. Drive-through AMSA/OMS plan.

## 3-11. Direct support and general support (DS/GS).

a. Function. Direct support and general support (DS/GS) maintenance shops will be built only in support of a facility whose mission is DS/GS maintenance. This level of maintenance activity requires more specialized repair, calibration equipment and highly skilled repairmen. The missions of specific units vary widely. Consequently, a standard design or even a functional space breakdown has not been developed for DS/GS units. The facilities program will define the specific functional area breakdown and ancillary support equipment required for each DS/GS shop building.

b. General design requirements. The user will provide a precise definition concerning the various maintenance functions of the DS/GS shop and the actual and perceived relationship between the various functions. The functional and physical requirements of the support facilities must be fully defined to insure correct design and layout. DS/GS shops are rarely built separately from a United States Army Reserve Center (USARC); therefore, they will normally be built as a part of an OMS or as an addition to an existing OMS. If the facility's site has sufficient area, it may be more functional and economical to build a separate structure. The nature of the DS/GS shop operations require that all space be exclusive use. Therefore, the DS/GS shop will usually only share a central HVAC unit, a common wall, access/egress and toilet facilities with the OMS or OMS/AMSA. Support facilities for a DS/GS will be defined in the facilities program for a specific project and may include a small MEP area, outside storage, covered storage and an adjacent concrete apron pad for location and operation of mobile maintenance shop trucks and vans. The design criteria for standard areas such as the shop office, tool room, battery room, flammable storage and work bays are the same as those for the OMS. Special maintenance areas, such as tent repair, sheet metal shop, paint shop, welding shop, etc., will be provided as required by the project documentation.

## 3-12. Equipment concentration site (ECS).

a. Function. An ECS is essentially a large MEP area for the storage of military vehicles and equipment which are to be used during annual and weekend training periods.

b. General design requirements. With few exceptions, an ECS is always located on an active or semi-active military installation and is collocated with an AMSA dedicated to maintaining the equipment stored at the ECS. Facilities which may be associated with an ECS, as provided for in the facilities program, are the parking hardstand, fuel dispensing system, loading ramp, wash platform, indoor equipment storage warehouse, combat vehicle arms vault, fencing, security lighting and an AMSA. Factors which affect the layout and design of an ECS are much the same as those for the MEP at an OMS or AMSA, with the following exceptions:

(1) Access/egress and circulation. Tracked combat vehicles are stored at an ECS and require access to the nearest tank trail on the military installation. In instances where asphalt paving or circulation areas are provided around a supporting AMSA, a concrete roadway or turning area may be required to provide access for combat vehicles to the AMSA shop bays. Due to

the larger size and heavier concentration of vehicles, the ECS traffic is very heavy during annual training periods. Traffic patterns, therefore, should be carefully laid out to avoid severe internal circulation conflicts at the fuel pumps, dispatch and washracks. Circulation lanes within the ECS area should be 24 feet wide.

(2) Fuel dispensing point. When authorized, the fuel point should be located adjacent to a primary circulation area and in proximity to the main entrance and other support facilities. The lanes and pump bases for the diesel and gas pumps should be concrete and should be drained so that all gas spills and water runoff are collected and emptied into a grease/ oil separator. The separator should also serve the AMSA work bays and vehicle washrack, whenever practicable.

(3) Indoor equipment storage warehouse. Since the primary function of this building is bulk storage of equipment, the structure must be non-combustible and as simple as possible. Pre-engineered metal buildings are acceptable. The interior layout should be open for flexibility and provide aisles large enough for material handling equipment. Depending on the type and the amount of equipment, a loading dock may be provided at one exit. A small portion of the building serves as a work area and should be heated to 68 degrees Fahrenheit in the winter. An office for the warehouseman should also be provided. Information concerning the types and amount of equipment to be stored and the types of material handling equipment to be operated within the warehouse will be provided by the Using Service.

#### Section IV. SPACE PLANNING

3-13. Functional relationships. Figures 3-76, 3-77 and 3-78 illustrate the functional relationships of a training center building, a drive-through AMSA and a drive-through AMSA/OMS respectively.

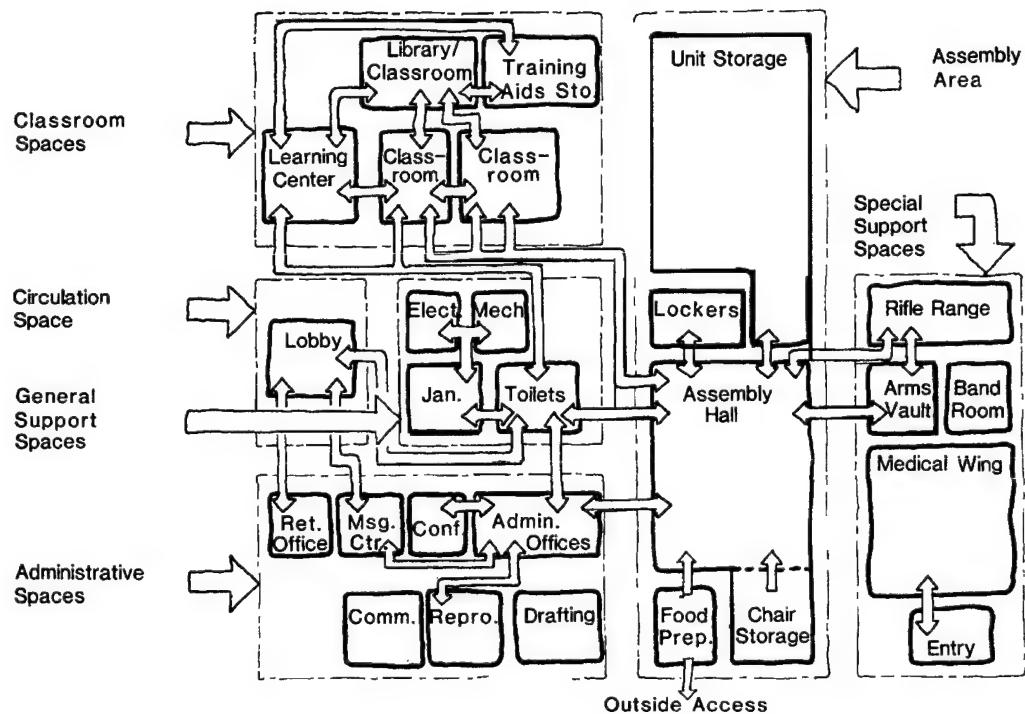


Figure 3-76. Training center building functional -relationships.

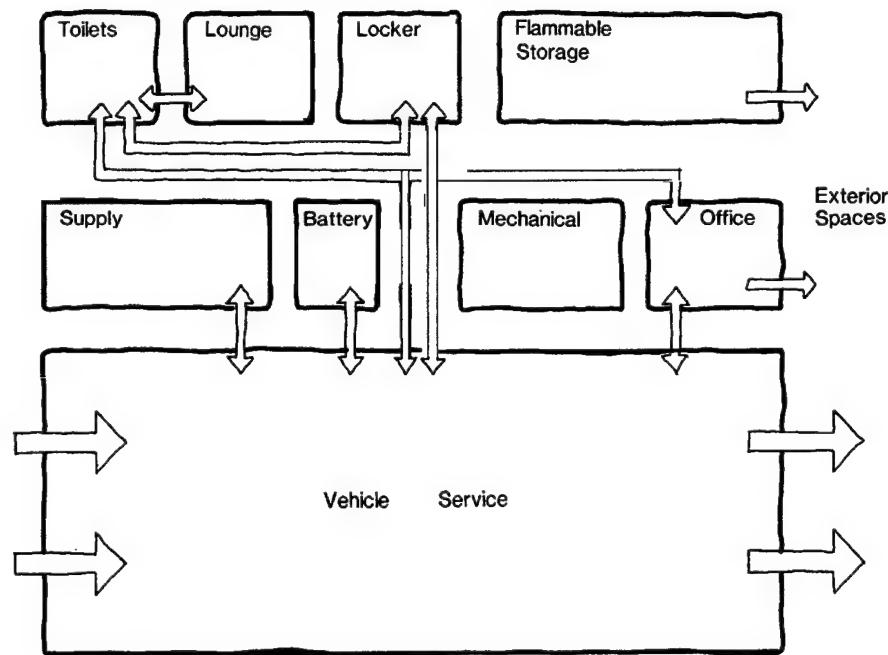


Figure 3-77. Drive-through AMSA functional relationships.

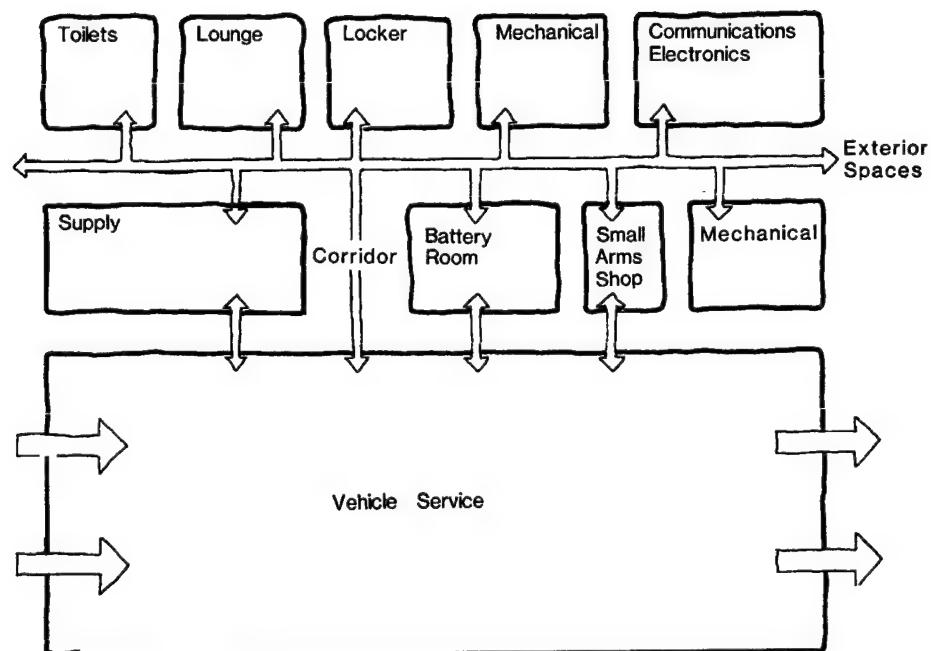


Figure 3-78. Drive-through AMSA/OMS functional relationships.

## CHAPTER 4

## DESIGN CONSIDERATIONS

## 4-1. Architectural.

- a. The total architectural design should embody current industry and military standards. In the event of conflict, the more stringent standards will normally prevail.
- b. The schematic design concept should be based on a simple, logical idea which satisfies the requirements of the program, site, user functions and long life maintenance. Each project is individual and requires a concentrated effort to develop the appropriate solution.
- c. The materials and their methods of construction proposed for use on a facility must have been used (preferably by the Design Agency) in several projects which can be researched to ascertain the product's performance characteristics. Materials as well as the design must be able to stand the test of time.
- d. The complete coordination of engineering discipline interface is the responsibility of the Design Agency. A check for structural, HVAC, electrical and plumbing and fire protection conflicts is an important aspect of the design process.
- e. Interior finishes are similar in most of the individual spaces within larger functional areas. Table 4-1 is a suggested schedule of interior finishes.
- f. Roof design is an especially important area of design. Consider the impact that the roof design has on drainage. Pitched roofs with gutters may avoid the use of costly interior roof drains.
- g. Fenestration should be located where functionally appropriate. Consider the impact of window sizes, locations, eave overhangs, etc. on energy conservation. Operable windows should be provided, if possible, for ventilation flexibility. Window blinds on exterior windows should be used in offices and classrooms.
- h. Consider passive solar designs, use of daylighting, increased wall and roof insulation, internal thermal mass and earth berms in the development of the architectural design. See section 4-7, energy conservation.
- i. The following types of doors are typically used:
  - (1) Main exterior doors should be double doors with removable mullions and push-button combination security locks.
  - (2) Fire doors should be U.L. listed, with door and frame fire rated as required, and with panic hardware as required.

(3) Vault doors will be Class V as per AR 190-11.

(4) Classroom doors should be solid core with a minimum 40 STC rating, provided with a privacy lock, and should not be provided with glazing.

(5) Storage room doors should be solid core, provided with a latchset and dead bolt.

j. All doors should be 3 feet wide, minimum.

k. Signage for the building exterior and interior should be included in the project design. Building signage will be contractor supplied and installed. Refer to TM 5-807-10. See appendix B for list of typical signs required.

1. Recommended finishes for the training center building and maintenance facilities are described in table 4-1. Individual projects may require variations.

TABLE 4-1. Finishes

<u>FLOORING</u>		<u>BASE</u>	
CONC	Concrete	CT	Ceramic Tile
CPT	Carpet	GMU	Glazed Masonry Units
CT	Ceramic Tile	QT	Quarry Tile
QT	Quarry Tile - Abrasive	RB	Rubber
VCT	Vinyl Composition Tile		

<u>WALLS</u>		<u>CEILING</u>	
AFP	Acoustical Fiber Panel	ACT	Acoustical Ceiling Tile
CMU	Concrete Masonry Units	APP	Acoustical Fiber Panel
CONC	Concrete (with hardener)	CONC	Concrete
CT	Ceramic Tile	EXP	Exposed Construction
-EP	Epoxy Paint	GWB	Gypsum Wall Board
-EXP	Exposed	WRGWB	Water Resistive GWB
GMU	Glazed Masonry Units		
GWB	Gypsum Wall Board		
MFG	Molded Fiber Glass		
-P	Paint		
PNL	Paneling		
WRGWB	Water-Resistive GWB		
WSCT	Hard Finish Wainscot		
C	Chair Rail		

TABLE 4-1. Finishes (Continued)

## TRAINING CENTER BUILDING

SPACE	FLOOR	BASE	WALLS	CEILING	HEIGHT	NOTES
<b>Circulation:</b>						
Lobby	VCT	RB	GWB	-	9'-0"	
Corridor	VCT	RB	GWB-WSCT*	ACT	9'-0"	*Alternate: CMU-P
<b>Administrative areas:</b>						
Admin. offices	VCT*	RB	GWB**-C	ACT	9'-0"	*Alternate: CPT **Alternate: PNL
Retention office	VCT*	RB	GWB-P	ACT	9'-0"	*Alternate: CPT
Conference	VCT*	RB	GWB-P	ACT	9'-0"	*Alternate: CPT
Message center	VCT	RB	GWB-P	ACT	9'-0"	
Reproduction	VCT	RB	GWB-P	ACT	9'-0"	
Drafting	VCT	RB	GWB-P	ACT	9'-0"	
Communications	VCT	RB	GWB-P	ACT	9'-0"	
<b>Classroom areas:</b>						
Classroom	VCT*	RB	GWB-P-C**	ACT	9'-0"	*Alternate: CPT **Movable Partition
Learning center	VCT*	RB	GWB-P-C	ACT	9'-0"	*Alternate: CPT
Library/classroom	VCT*	RB	GWB-P-C	ACT	9'-0"	*Alternate: CPT
Training aid storage	VCT*	RB	GWB-P	ACT	9'-0"	
<b>Assembly hall:</b>						
Assembly hall	VCT*	RB	CMU-P**	ACT	Varies 10'-0" min.	*Alternate: Hardened concrete **Alternate: GWB-P
Maint./chair storage	VCT	RB	GWB-P	ACT	10'-0"	

TABLE 4-1. Finishes (Continued)

## TRAINING CENTER BUILDING

SPACE	FLOOR	BASE	WALLS	CEILING	HEIGHT	NOTES
Food prep.	QT	QT*	CMU-EP**	WRGBW**** w/Epoxy Paint	9'-0"***	*Alternate: GMU; CT **Alt.: GMU; CT ***Determined by exhaust hood clearance. ****Alternate: MFG
Food storage	QT	QT*	CMU-EP**	WRGBB*** w/Epoxy Paint	9'-0"	*Alternate: GMU; CT **Alternate: GMU; CT ***Alternate: MFG
Scullery	QT	QT*	CMU-EP**	WRGBB*** w/Epoxy Paint	9'-0"	*Alternate: GMU; CT **Alternate: GMU; CT ***Alternate: MFG
<u>Un g ea</u>						
Unit storage	CONC	N/A	CMU-P*	EXP-P**	10'-0"	*Also caging where applicable. Use factory finished caging material. **Paint ceilings white.
Lockers	CONC	N/A	CMU-E**	EXP-P*	10'-0"	*Paint ceilings white. **Use factory finished caging material.
<u>General and special support areas:</u>						
Toilets	CT	CT	CMU-EP	WRGBB w/Epoxy Paint	9'-0"	
Showers	CT*	CT*	CT*	WRGBB	9'-0"	*Alternate: MFG
Janitor's closet	CONC	N/A	CMU-EP	ACT	9'-0"	
Mechanical	CONC	N/A	CMU-E*	EXP*	-	*Walls and ceiling to be sealed.
Arms vault	CONC	N/A	CONC*	CONC*	8'-2" min.	*Walls and ceiling to be sealed.
Rifle range	CONC	N/A	AFP* CMU-E	AFP* CMU-E	9'-4"	*Walls and ceiling to be sealed. See Standard Drawing for acoustical treatments.
<u>Medical wing:</u>						
Corridor	VCT	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
Waiting	VCT	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P

TABLE 4-1. Finishes (Continued)

## TRAINING CENTER BUILDING

SPACE	FLOOR	BASE	WALLS	CEILING	HEIGHT	NOTES
Dressing	VCT	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
Medical exam	VCT	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
Dental exam	VCT	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
Laboratory	VCT	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
Toilets	CT	RB	CMU-P*	WRGWB	9'-0"	*Alternate: GWB-P
Sterile supply	VCT	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
Dark room	VCT	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
Eye exam	VCT	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
General supply	VCT	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
Pharmacy	VCT	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
Photo labs	VCT	RB	GWB-EP	ACT	9'-0"	
Soils testing lab	VCT	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
SCIF	Carpet	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
Band room	Carpet	RB	CMU-P*	ACT	9'-0"	*Alternate: GWB-P
<u>Organizational maintenance shop:</u>						
Shop office	VCT	RB	CMU-P*	GWB-P	8'-0"	*Alternate: GWB-P
Work bay	CONC	N/A	CMU-P	EXP	15'-0" min.	
Tool and parts	CONC	N/A	CMU-P*	EXP-P**	10'-0"	*Alternate: GWB-P. Use factory finished caging material. **Paint ceiling white.

TABLE 4-1. Finishes (Continued)

## TRAINING CENTER BUILDING

SPACE	FLOOR	BASE	WALLS	CEILING	HEIGHT	NOTES
Storage	CONC	N/A	CMU-P*	EXP-P**	10'-0"	*Alternate: GWB-P. Use factory finished caging material. **Paint ceiling white.
Battery	CONC*	N/A	CMU-P**	EXP-P**	10'-0"	*Seal floor with acid resistant sealer. **Alternate: GWB-P. Use factory finished caging material. ***Paint ceiling white.
Toilets	CT	CT	CMU-EP*	WRGWB-EP**	8'-0"	*Alternate: GWB-P **Epoxy paint on ceiling.
Flammable storage	CONC	N/A	CMU-EXP*	EXP-P**	10'-0"	*Use factory finished caging material. **Paint ceiling white.
Mechanical	CONC	N/A	CMU-EXP	EXP-P*	10'-0"	*Paint ceiling white.
<b>Area maintenance support activity:</b>						
Small arms shop & vault*	CONC	N/A**	CMU-P***	EXP	8'-2" min.	*Seal all exposed finishes. **Alternate: RB ***Alternate: GWB-P
Supply	CONC	N/A	CMU-P*	EXP-P**	10'-0"	*Use factory finished caging material. **Paint ceiling white.
Comm./elec. repair	CONC	N/A	CMU-P*	ACT	8'-0"	*Alternate: GWB-P
Break	VCT	RB	CMU-P*	ACT	8'-0"	*Alternate: GWB-P
Lockers	CONC	RB	CMU-P*	ACT	8'-0"	*Alternate: GWB-P
Toilets	CT	CT	WRGWB*-EP	WRGWB*-P	8'-0"	*Alternate: GWB-P

## 4-2. Structural.

a. The structural system should be the most cost effective design without restricting the architectural and engineering aspects of the building such as flexibility, function, character, and symmetrical configuration for seismic resistance. A variety of systems shall be considered and the one selected must satisfy the site, flexibility, future expansion, program, economic and availability requirements. Systems such as steel post and beam or long span

bar joist, precast, tilt-up concrete tees, etc., should be considered. However, a very economical system is masonry load bearing walls with steel joists and metal deck. Consider also heavy timber construction and pre-engineered buildings.

b. The structural design and construction materials and methods must conform to current industry and military standards.

c. In addition to the structural design criteria in DOD 4270.1-M, the seismic capability of existing structures must be evaluated. The analysis should be implemented as follows:

(1) A seismic evaluation of existing facilities will be limited to those in seismic zone 2 and above except for structures in seismic zone 1 which have large, long span systems, or which are two stories or more. For most buildings in seismic zones 1 and 2, the wind load may govern the design.

(2) The seismic evaluation analysis will be carried to the extent necessary to determine a reasonable estimate of the life safety requirement (safety of personnel, i.e., to prevent collapse of building). Where complete design data and as-built drawings are not available, investigation of the structure will be made as necessary to perform the life safety evaluation and will be based on the following:

(a) Calculations will ordinarily be limited to the analysis of representative frames or load bearing shear walls in both directions of the structure. Seismic forces will be carried to the foundations.

(b) Roof and floor diaphragms will be investigated to transfer the lateral load to the frames or shear walls, particularly the connections.

(c) Non-reinforced masonry filler walls will be assumed to have no resistance capacity and will be susceptible to damage. However, if there are many of these walls which appear to provide substantial lateral load restraint without exceeding the allowable stresses, they may be considered as part of the seismic resisting system.

(d) When the strength of materials in concrete construction or the strength of the load-bearing masonry walls is critical for the investigation or in determining the necessary remedial measures, core samples will be taken and tested to determine the values to be used for developing the conclusions.

(e) Life safety of the existing structure is defined as meeting 80 percent of the lateral resistance (strength requirements) required by code. However, any strengthening or remedial measures to be provided will be designed to meet 100 percent of the lateral resistance of the code.

(f) Detailed requirements in TM 5-809-10 which directly apply to new facilities for ductility in frames, connections to account for walls, isolation of non-structural masonry walls, clearances to account for story drift and support of non-structural and mechanical and electrical elements should not be made applicable to existing construction. However, the existing

partitions and walls without lateral support at the top, or without straying from a relatively rigid ceiling system near the top, will be provided with lateral support against earthquake forces in accordance with TM 5-809-10. Mechanical and electrical equipment will be anchored for facilities in seismic zones 3 and 4. All new partitions, suspended ceilings, mechanical and electrical elements, and systems must be designed in accordance with TM 5-809-10 requirements.

4-3. Mechanical.

a. Mechanical systems should be selected and designed in accordance with the requirements of DOD 4270.1-M. The emphasis of systems analysis should be placed on the occupancy profile for various areas of the building. Areas requiring only part time occupancy, with conditions being maintained at the unoccupied level the remainder of the time, will be isolated from the full time occupied area. Specific humidity control systems are not required except for arms storage vaults. Ventilation requirements listed in individual space criteria are minimums. Provisions will be made to introduce ventilation air only during the occupied hours of the specific space. System recommendation and general design guidelines for applications not specifically covered in this manual should be based on the latest recommendations of the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Guide and Data Book.

b. Indoor design conditions for both unoccupied and occupied spaces for the various types of occupancy will be in accordance with table 4-3, Schedule of requirements, in this manual. Outdoor design conditions will be based on criteria listed in DOD 4270.1-M.

c. In general, factory fabricated, unitary mechanical equipment will be provided with attention given to proper access for maintenance and appropriate controls for both occupied and unoccupied maintenance of environmental conditions.

d. Use night set-back thermostats and time clocks to reduce building temperatures during unoccupied hours, and to provide automatic control. Thermostats should be provided with protective shields in exposed areas. Use mechanical ventilation or economizer cycles to meet the building's cooling requirements when practical. Consider the use of heat recovery equipment in areas with high ventilation requirements or to capture heat for domestic water preheating. Specifications should require the use of high efficiency components such as motors and low leakage dampers. Adequately sized pipes and ducts with smooth transitions, properly selected and protected with insulation should be installed in accordance with manufacturers requirements.

e. Mechanical room space will be as required; not borrowed from other space allocations.

f. Small occupied spaces remotely located from the majority of occupied spaces should be provided with small auxiliary HVAC units as authorized by DOD 4270.1-M.

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e. Mechanical room space will be as required; not borrowed from other space allocations.

f. Small occupied spaces remotely located from the majority of occupied spaces should be provided with small auxiliary HVAC units as authorized by DOD 4270.1-M.

g. Special equipment, such as computers or electronic telephone switchboards, may require special temperature and humidity controls.

h. Boilers should be provided with chemical treatment of water where required.

#### 4-4. Electrical.

a. The design for the electrical systems should include provisions of safe and economical electrical distribution, lighting, communications and signaling systems meeting present requirements and anticipated future growth.

b. The interior electrical distribution will be designed for the most efficient and economical distribution of energy, using the highest voltage consistent with the load served. A three-phase 208/120 volt system will generally be the minimum system employed, with consideration given to using a 480/277 volt system as service voltage where large equipment loads (relative to lighting and miscellaneous power) are encountered.

(1) Service and distribution equipment should be of the circuit breaker or fusible switch type. Branch circuit panelboards should be of the circuit breaker type.

(2) Provide a single main circuit disconnect device only if more than five circuits, not including the egress and emergency lighting disconnect, are fed from the main service switchboard.

(3) Egress and emergency lighting circuits (including battery back-up) should be on a separate main disconnect device.

(4) Direct burial type cables for exterior branch circuit wiring should be provided in lieu of conductors in conduit, except under paved areas.

(5) Types NMC and AC cable will not be used for interior wiring.

(6) Ground fault provisions will be as required by NFPA 70.

(7) Power panels and electrical equipment should not be located in range storage rooms, unit supply areas, chair storage or tool and parts storage areas. Shallow closets should be provided for electrical, telephone and auxiliary system equipment, where required.

(8) A 110 volt electrical duplex convenience outlet should be provided in each enclosed office, and in all areas of the facility, such that a 20-foot cord can reach any point on the floor with the exception of the assembly hall.

(9) Provide a fire alarm system with fused disconnect switches. A fused disconnect switch clearly marked and separate from the panel circuit breakers minimizes the possibility of inadvertently disconnecting these systems.

(10) Provide conduit for the intrusion detection system.

(11) Intrusion detection systems are not procured with project funds.

c. The exterior electrical system should include the following features:

(1) Primary electric service should be underground from the nearest pole to a pad-mounted, three-phase transformer located near the exterior of the mechanical equipment room or load center.

(2) Secondary electric service from transformers should be underground. Secondary service conductors should be in conduit.

(3) Consider hinged light poles for MEP lighting for remote locations.

e. The lighting system design objectives are to economically provide lighting levels for pleasant, efficient working conditions and effective night time vision for security.

(1) Lighting levels will conform to the footcandle levels established in the individual space criteria sections of this guide. DOD 4270.1-M applies to those areas and tasks not specifically covered.

(2) Consideration should be given to the use of non-uniform and task lighting layouts where applicable.

(3) Switching to provide reduced lighting levels in classrooms, assembly areas and other appropriate spaces should be provided.

(4) Fixture types should be as follows:

(a) Fluorescent lighting fixtures should be used throughout the facility. One tube size should be used to save operating costs and to reduce replacement problems.

(b) Use metal halide lighting fixtures in high bay areas for economy and good color rendition. Fluorescent lighting fixtures should be used to supplement the metal halide system and to provide immediate light response.

(c) Exterior security lighting, when required for the perimeter of buildings and parking areas, should be high pressure sodium vapor, controlled by photo-electric cells. Exterior security lighting should be provided at entrances to the building, at sidewalks from parking lots to the entrance, MEP and other areas as required. Site lighting should be kept off of adjacent property by directing the lighting toward the facility site. Vandal resistant lenses should be provided where required.

#### 4-5. Plumbing.

a. Plumbing systems should incorporate water and energy conserving fixtures and equipment.

b. Plumbing fixtures should be provided with vandal resistant features.

c. Hose bibs for landscaping should be provided on the exterior as required. However, to prevent unauthorized vehicle washing, do not locate hose bibs adjacent to parking areas.

d. Refer to TM 5-813-3 for hardness or other similar requirements.

4-6. Fire protection.

a. Fire safety features should conform to DOD 4270.1-M and applicable standards of the latest edition of the National Fire Codes, published by the National Fire Protection Association (NFPA), or to the standards of the locally accepted building code, whichever is more stringent. Before fire sprinklers are used, the designer must study and provide alternative means of fire protection.

b. Provide a manual fire alarm and evacuation system designed in accordance with code requirements.

c. Illuminated exit signs and emergency lighting should be provided in accordance with NFPA 101, Life Safety Code.

d. Location of fire extinguisher cabinets and brackets should conform to NFPA 10 and should be furnished and installed by the contractor. Fire extinguishers will be furnished and installed by the government.

e. A comprehensive analysis and plan showing all fire protection features and systems should be developed for each project design. The analysis and plan should provide:

(1) Type of occupancy.

(2) Type of construction.

(3) Location of fire-rated walls, doors and dampers, including enclosures for hazardous areas.

(4) Exit travel distances.

(5) Horizontal exits.

(6) Occupant load/exit unit widths.

(7) Automatic extinguisher systems.

(8) Fire detection/alarm devices.

(9) Sprinklered areas (as appropriate).

f. Table 4-2 lists typical occupancy loads for facilities.

Table 4-2. Occupancy classification

## TRAINING CENTER BUILDING

SPACE	OCCUPANCY	REMARKS	OCCUPANCY CLASSIFICATION
Lobby	Varies	-Panic hardware on exterior doors -Door width based on building occupancy load -Push/pull hardware on entrance doors -Safety rails on glass entrance doors &	-Business or assembly if adjacent to assembly hall
Corridor	Varies	-One hour fire rated construction -6'-0" minimum width	-Business
<b>Administrative areas:</b>			
Administrative offices	100 sq.ft./person in exclusive use areas 50 sq. ft./person in common use areas		-Business
Retention office	1-4 Persons		-Business
Conference	20-30 Persons	-Occupancy load based on 15 sq.ft./person	-Business
Message center	2-3 Persons		-Business
Reproduction	1-4 Persons		-Business
Drafting	1-4 Persons		-Business
Communications	2-8 Persons		-Business
Computer equipment	N/A		-Business
<b>Classroom areas:</b>			
Classroom	Allow 20 sq.ft./person	See Note 1	-Business
Learning center	Allow 20 sq.ft./person	See Note 2	-Business
Library/classroom	Allow 20 sq.ft./person	Same remarks as Learning Center	-Business
Training aid storage	1 or 2 persons	One hour fire rated construction	-Business
<b>h</b>			
Assembly hall	50-300 persons maximum	-Enclose with one hour fire rated construction (Class "C") -At an occupancy rate of 7 square feet per person, an authorization of 2100 square feet or greater cannot be "Class C" construction -Number of exits: - minimum of 2 remote exits - 100 persons/unit of exit - 20 ft. maximum common travel distance	-Place of assembly
Maintenance and chair storage	N/A	One hour fire rated construction	-Business
Food preparation		One hour fire rated construction Hoods, cooking surfaces and ducts must have automatic extinguishing systems	-Business
Food Storage	Business	One hour fire rated construction	-Business
Scullery	Business	One hour fire rated construction	-Business
<b>Unit storage areas:</b>			
Unit storage	2-3 Persons per each assigned military unit	One hour fire rated construction	-Business
Lockers	Varies	One hour fire rated construction	-Business

Table 4-2. Occupancy classification (Continued)

SPACE	OCCUPANCY	REMARKS	OCCUPANCY CLASSIFICATION
<b>General and special support areas:</b>			
Toilets & showers	Business		-Business
Janitor's closet	N/A	One hour fire rated construction	-Business
Mechanical equipment	N/A	If combustible heat source units are used, provide 1 hour fire rated construction including ceiling	-Business
Arms vault	N/A	An emergency escape device must be provided from the vault interior when the door is locked. Security provisions will be provided.	-Business
Rifle range	7 persons for a 3-lane range. 2 persons will be added for each additional lane		-Business
Medical wing	Varies from 10-30 persons		-Business
Photo lab	2-3 persons		-Business
Soils testing lab	2-3 persons		-Business
SCIF	3-4 persons		-Business
Band room	42 persons		-Business
<b>Organizational maintenance shop:</b>			
OMS-shop office	1-2 persons		-Business
OMS-work bay		See Note 3	-Industrial
OMS-tools & parts	1-3 Persons	If the space exceeds 1,500 sq.ft., it must be separated by a 1 hour fire rated construction	
OMS-storage	1-3 Persons	Same as OMS-tools & parts	-Business
OMS-battery	1-2 Persons	-One hour fire rated construction -Design to NFPA 70 -Sprinklers are not required	-Business
OMS-toilets	N/A	-Provide safe egress to exterior	-Business
OMS-flammable	N/A	-An eyewash/deluge shower should be provided outside of the space	-Industrial high hazard
OMS-mechanical equipment	N/A	-If combustible heat source units are used, provide 1 hour rated construction.	
<b>Area maintenance support activity:</b>			
AMSA-small arms shop	1-2 Persons	-One hour fire rated construction -Sprinklers are not required	-Industrial
AMSA-supply	1-2 Persons		-Storage
AMSA-communications/electronic repair	2-3 Persons	-One hour fire rated construction -Sprinklers are not required	-Industrial
AMSA-breakroom	5-10 Persons	-Safe egress to building exterior	-Business
AMSA-lockers	5-10 Persons	-Safe egress to building exterior	-Business
AMSA-toilets	N/A	-Safe egress to building exterior	-Business

Table 4-2. Occupancy classification (Continued)

NOTE 1. Exception #1: Classrooms with 50 or more occupants will be designed as a place of assembly occupancy.

Exception #2: Portions of buildings which serve a unit, such as a school command, and require a concentration of classrooms will be designed as a place of educational occupancy and will satisfy the following criteria:

- Minimum 2 exits/floor - remote
- Maximum common path of travel - 20 ft.
- Maximum travel distance - 150 ft.

Interior corridor - 6 feet clear corridor width, one hour rating, with 20 minute rating on doors.

Room or space with capacity of over 50 persons, or 1,000 sq.ft., must have two exits which open out.

Minimum one window for ventilation and rescue (clear opening shall not be less than 20 inches wide, 24 inches high, 5.7 sq.ft. in area, with the sill height not more than 44 inches).

NOTE 2. Exception #1: Portions of buildings having classrooms with 50 or more occupants must be designed as a place of assembly occupancy.

Exception #2: Portions of buildings which serve a unit, such as a school command, and require a concentration of classroom must be designed as a place of educational occupancy and satisfy the following criteria:

- Minimum 2 exits/floor - remote
- Maximum common path of travel - 20 feet
- Maximum travel distance - 150 feet.

Interior corridor - 6 feet clear corridor width, one hour rating, with 20 minute rating on doors.

NOTE 3. When the operational requirement is that no repair work is to be done except exchange of parts, maintenance requiring no open flame and welding, or use of highly flammable liquids, the maximum floor area will be 12,000 square feet with no sprinklers for non-combustible construction.

Repair garages will not require sprinklers when the floor area is 9,000 square feet or less for non-combustible construction. See NFPA 88B. Direct egress from the workbays should be provided through a personnel door.

#### 4-7. Energy conservation.

a. Energy conservation through building design has received a great deal of attention in recent times. Tremendous potential exists for trimming energy consumption and operating costs in both new and existing buildings.

b. In compliance with Executive Order 12003, existing facilities must reduce energy consumption by 20 percent of their 1975 energy budget. New facilities should be designed to use 45 percent less energy than a similar building of 1975 vintage.

c. To establish an energy conservation target for existing buildings, an energy budget of the building for 1975 must be determined. Through the use of existing energy consumption data and computer based energy use analysis programs such as BLAST, E-CUBED, TRACE, ESP-II, etc., an approximate energy consumption base line can be determined and the target 20 percent reduction calculated. If complete analysis is required, use the most cost effective of the above programs.

d. For new construction, the target energy budget figures, expressed in BTU's per square foot per year may be obtained from ETL 1110-3-309.

e. Energy conservation opportunities (ECO) should be selected to meet the target energy budget for either new or existing facilities. The ECO will then be analyzed by computer based energy usage simulation techniques. These procedures will model the facility as an entire system so that the interaction of one ECO with another can be analyzed and the net energy savings determined.

f. From the analysis of the various ECOS, the most efficient and cost effective systems which meet the energy budget should be utilized. Cost effectiveness should be based on the life cycle cost. ECOS should demonstrate a simple payback for less than the 25 year life of the building. An ECO's life cycle cost should be calculated in accordance with ETL 1110-3-332.

g. ECOS may be broadly classified into six areas. These classifications and examples of each are listed below.

(1) Site related ECO:

(a) buildings located to utilize winter sun, prevailing winds, and natural land forms.

(b) landscaping and planting to shade the building from summer sun and to block winter winds.

(2) Building envelope ECO:

(a) new or replacement insulation: thicknesses, insulating values, insulation placement, and vapor barriers.

(b) energy efficient windows: reduced glass area, the number of panes, light transmission and reflectivity, type of window construction, window placement, double/triple glazed windows, etc.

(c) protection of windows from direct summer sun: overhangs, shades, blinds, solar films, tinted glass, solar screens and plantings.

(d) weather stripping and caulking to reduce infiltration.

(e) entrance vestibules.

(f) building shapes or frames with low exterior surface to volume ratio.

(g) maximize advantage of winter solar heat gain and natural daylight.

(h) earth contact designs such as full or partial wall berms or underground structures.

(3) Distribution system ECO:

(a) pipe and duct insulation.

(b) new or replacement steam traps.

(c) adjustable flow rates on fans and pumps to carefully match load.

(4) HVAC equipment ECO:

(a) system zones based on the user profile of the building.

(b) high efficiency boilers, furnaces and unit heaters.

(c) multiple boilers for better part load efficiencies.

(d) waste heat recovery devices.

(e) high efficiency air conditioning equipment.

(f) time clocks and set back thermostats.

(g) low leakage dampers.

(h) economizers.

(i) high efficiency filters to reduce ventilation and power usage.

(j) tempered air to exhaust hoods.

(k) computer based energy management systems.

(5) Domestic hot water ECO:

(a) insulated water heaters and storage tanks.

(b) water conserving fixtures.

(c) time clocks on water heaters.

(d) waste heat recovery for water heating.

(e) separate water heaters for kitchen and toilets.

(6) Lighting ECO:

(a) decreased light levels in non-critical areas.

(b) high efficiency lamps and ballasts.

(c) more efficient fixtures, and better lenses.

(d) task lighting.

(e) switching to allow for more individual control in unoccupied

areas or naturally lit areas.

(f) high efficiency exterior lighting with time clock or photocell control.

(g) daylighting where possible.

4-8. Public safety/handicapped.

a. Refer to the Occupational Safety and Health Administration (OSHA) for Public Safety related guidelines.

b. The following shall be provided for the physically handicapped:

(1) one designated parking space.

(2) one ramp at the main entrance.

(3) one unisex handicapped restroom on the ground floor.

4-9. Codes. These facilities will be designed in accordance with all Federal codes and other code guidelines contained herein. The Design Agency must verify which local codes, if any, are to be followed.

4-10. Environmental requirements. Environmental requirements such as heating, ventilating, cooling, lighting levels, etc., for the individual spaces in an Army Reserve Training Facility should follow guidelines in Table 4-3.

TABLE 4-3. Schedule of requirements.

LEGEND

H/O	Heating - Occupied
H/M	Heating - Maintained
C/O	Cooling - Occupied (as authorized by DOD 4270.1-M)
C/M	Cooling - Maintained (as authorized by DOD 4270.1-M)
V(CFM)	Ventilation - Outside Air Cubic Feet Per Minute Per Person
ASN(NC)	Air System Noise - Noise Criteria
SOUND (STC)	Sound - Sound Transmission Coefficient
LIGHT (F.C.)	Light - Footcandles
-	Not Applicable
(1)	Refer to Note 1 - See Legend (Typical for Notes 1-10)

NOTES:

(1) One air change per hour when occupied

(2) Ten air changes (including outside air changes) per hour when occupied.

(3) Adequate to remove excessive heat developed by equipment.

(4) Gas fired infra-red or electric radiant heat to be provided over the firing line by individual 16,000 BTUH units.

(5) Ventilation should be provided by an exhaust fan located at the target line. Make-up air should be supplied through a perforated wall at the back of the range. An air velocity of 35 FPM is desired ahead of the firing line.

TABLE 4-3. Schedule of requirements (Continued)

LEGEND

(6) See the Definitive Designs for a 600 inch rifle range, Field Design Number FD-28-13-03 and Corps of Engineers-Regulations (CE-R) series specification for acoustical considerations.

(7) 3/4 CFM/SF of floor area with intake at 18 inches above the finished floor. A separate overhead vehicle exhaust system should be provided.

(8) Four air changes per hour (including one outside air change).

(9) Gravity vent or mechanical exhaust. Ventilation equipment to be based on materials to be stored.

(10) 10 footcandles - explosion proof fixtures.

(11) Six air changes per hour, including one and one-half outside air changes per hour.

(12) Two air changes per hour.

(13) Two speed fan operation. Ten air changes per hour minimum in winter; twenty air changes per hour minimum in summer.

(14) Provide portable dehumidifier.

(15) No return air from these spaces.

(16) Separate system required.

**TRAINING CENTER BUILDING**

	H/O	H/M	C/O	C/M	(V)	(MC) ASN	(STC) SOUND	(F.C.) LIGHT
<b>Circulation:</b>								
Lobby	68	55	-	-	-	-	40	10
Corridor	68	55	-	-	-	-	40	10
<b>Administrative areas:</b>								
Admin. offices	68	55	78	Ambient	5	40	40	50
Retention office	68	55	78	Ambient	5	35	40	50
Conference	68	55	78	Ambient	5	35	40	30
Message center	68	55	78	Ambient	5	35	50	50
Reproduction	68	55	78	Ambient	5 (15)	-	40	30

TABLE 4-3. Schedule of requirements (Continued)

## TRAINING CENTER BUILDING

	H/0	H/M	C/0	C/M	(V)	(MC) ASN	(STC) SOUND	(F.C.) LIGHT
Drafting	68	55	78	Ambient	5	35	40	50
Communications	68	55	78	Ambient	5	45	40	50
Computer equipment	68	55	78	Ambient	5	35	50	30
<b>Classroom area:</b>								
Classroom	68	55	78	Ambient	5	30	40	50
Learning center	68	55	78	Ambient	5	30	40	50
Library/classroom	68	55	78	Ambient	5	30	40	50
Training aid storage	55	-	-	-	-	-	-	30
<b>Assembly hall:</b>								
Assembly hall	68	55	78	Ambient	5	40	-	50
Maint./chair storage	-	55	-	-	-	-	-	10
Food prep.	68	55	-	-	(2)(15)	-	-	50
Food storage	-	55	-	-	(3)	-	-	30
Scullery	68	55	-	-	(2)	-	-	50
<b>Unit storage area:</b>								
Unit supply	68	55	-	-	(1)	-	-	30
Lockers	68	55	-	-	(2)	-	-	10
<b>General and special support areas:</b>								
Toilets and showers	68	55	-	-	(2)(15)	-	-	30
Janitor's closet	-	55	-	-	(2)	-	-	10

TABLE 4-3. Schedule of requirements (Continued)

## TRAINING CENTER BUILDING

	H/0	H/M	C/O	C/M	(V)	(MC) ASN	(STC) SOUND	(F.C.) LIGHT
<u>Mechanical equip. room</u> - <u>electrical/phone space</u>		55	-	-	(12)(3)	-	-	30
Arms vault	-	-	-	-	(14)	-	-	50
Rifle range	(4)	45	-	-	(5)(15)	-	(6)	30
<u>Medical wing:</u>								
Corridor	68	55	78	Ambient	(8)	35	40	10
Waiting	68	55	78	Ambient	(8)	35	40	30
Dressing	70	55	78	Ambient	(8)	35	40	10
Medical exam room	68	55	78	Ambient	(8)	35	40	10
Dental exam	68	55	78	Ambient	(11)(15)	35	30	10
Laboratory	68	55	78	Ambient	(11)(15)	35	40	50
Toilets	68	55	78	Ambient	(2)(15)	35	40	10
Sterile supply	68	55	78	Ambient	(11)	35	40	30
Darkroom	68	55	78	Ambient	(2)(15)	35	40	30
PE, EKG, eye exam, ht./wt.	68	55	78	Ambient	(8)	35	30	100
Audiometer room	68	55	78	Ambient	(8)	35	55	50
General supply	68	55	78	Ambient	-	35	40	30
Pharmacy	68	55	78	Ambient	(8)(15)	35	40	50
Photo labs	68	55	78	Ambient	(2)(15)	35	40	50

TABLE 4-3. Schedule of requirements (Continued)

**TRAINING CENTER BUILDING**

	H/O	H/M	C/O	C/M	(V)	(NC) ASH	(STC) SOUND	(P.C.) LIGHT
Soils testing lab	68	55	78	Ambient	5	35	40	50
SCIF	68	55	78	Ambient	5 (16)	35	40	50
Band room	68	55	78	Ambient	5	35	40	50
<b>Organizational maintenance shop:</b>								
Shop office	68	55	78	Ambient	5	40	40	50
Work bay	55	55	-	-	(7)	-	-	30
Tool and parts	55	55	-	-	(1)	-	-	30
Storage	55	55	-	-	(12)	-	-	30
Batteries	-	55	-	-	(11)	-	-	(10)
Toilets	68	55	-	-	(2)	-	-	20
Flammable storage	-	55	-	-	(9)	-	-	(9)
Mechanical equipment	-	55	-	(3)	(13)	-	-	30
<b>Area maintenance support activity:</b>								
Small Arms shop	-	55	78	Ambient	(1)(15)	-	-	50
Vault	-	-	-	-	(14)	-	-	50
Supply	-	55	-	-	(3)	-	-	30
Comm./elec. repair shop	68	55	78	Ambient	(1)	35	-	50
Break	68	55	78	Ambient	(1)	-	-	30
Lockers	68	55	-	-	(2)	-	-	10
Toilets	68	55	-	-	(2)	-	-	10

## APPENDIX A

## ITEMS FUNDED WITH OMAR FUNDS

- A-1 . Wall lockers.
- A-2 . Supply room caging.
- A-3 . Supply room shelving.
- A-4 . Arms vault dehumidifier.
- A-5 . Arms vault caging.
- A-6. Battery room shelving.
- A-7. Kitchen equipment.
  - a. Table ware dispenser.
  - b. Mobile tray rack.
  - c. Silverware dispenser.
  - d. Coffee maker.
  - e. Tray bussing rack.
  - f. Cold food counter.
  - g. Hot food table.
  - h. Mixer bowls storage rack.
  - i. Deep fat fryer.
  - j. Mixing machine.
  - k. Mixer stand.
  - l. Mobile food preparation sink.
  - m. Can opener.
  - n. Meat slicing machine.
  - o. Frozen food cabinet.
  - p. Mobile storage shelving.
  - q. Refrigerator.

APPENDIX B

BUILDING SIGN LIST

- B-1. Installation entrance signs at vehicular entrances to site.
- B-2. Building identification sign and memorial plaque at main entrance.
- B-3. Building directory at lobby.
- B-4. Room identification signs:
  - a. Men's and women's restroom signs.
  - b. Fire stair signs.
  - c. Room number.
  - d. Function signs.
- B-5. Building evacuation signs.
- B-6. Handicapped signs:
  - a. Parking stalls.
  - b. Toilet rooms.

## APPENDIX C

## ACRONYMS

AMSA . . . . . Area maintenance support activities  
ASHRAE . . . . . American Society of Heating, Refrigerating and Air  
                    Conditioning Engineers  
BMAR . . . . . Backlog of maintenance and repair list  
CE-R . . . . . Corps of Engineers Regulation  
CWE . . . . . Current working estimate  
Design Agency . . Corps of Engineers and supporting architectural/  
                    engineering firms  
DIA . . . . . Defense Intelligence Agency  
DOD . . . . . Department of Defense  
DS/GS . . . . . Direct support and general support maintenance shops  
ECO . . . . . Energy conservation opportunities  
ECS . . . . . Equipment concentration site  
FPM . . . . . Feet per minute  
HID . . . . . High intensity discharge lighting  
HVAC . . . . . Heating, ventilating, and air conditioning  
IDS . . . . . Intrusion detection system  
LCC . . . . . Life cycle cost  
MCAR . . . . . Military Construction Army Reserve  
MEP . . . . . Military equipment parking area  
MMCAR . . . . . Minor Military Construction Army Reserve  
MOB . . . . . Military occupational specialty  
NBS . . . . . National Bureau of Standards  
NFPA . . . . . National Fire Protection Association  
OCE . . . . . Office of the Corps of Engineers  
OMAR . . . . . Operation and Maintenance Army Reserve  
OMS . . . . . Organizational maintenance shops  
OSHA . . . . . Occupational Safety and Health Administration  
PA . . . . . Programmed amount  
PF . . . . . Protection factor  
POV . . . . . Privately owned vehicles  
SCIF . . . . . Secure compartmented intelligence facility  
STC . . . . . Sound transmission coefficient  
UBC . . . . . Uniform Building Code  
USARC . . . . . United States Army Reserve Center  
Using Service . . Office of the Chief, Army Reserve

## APPENDIX D

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ETL 1110-3-294 Interior Design Temperatures.  
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